



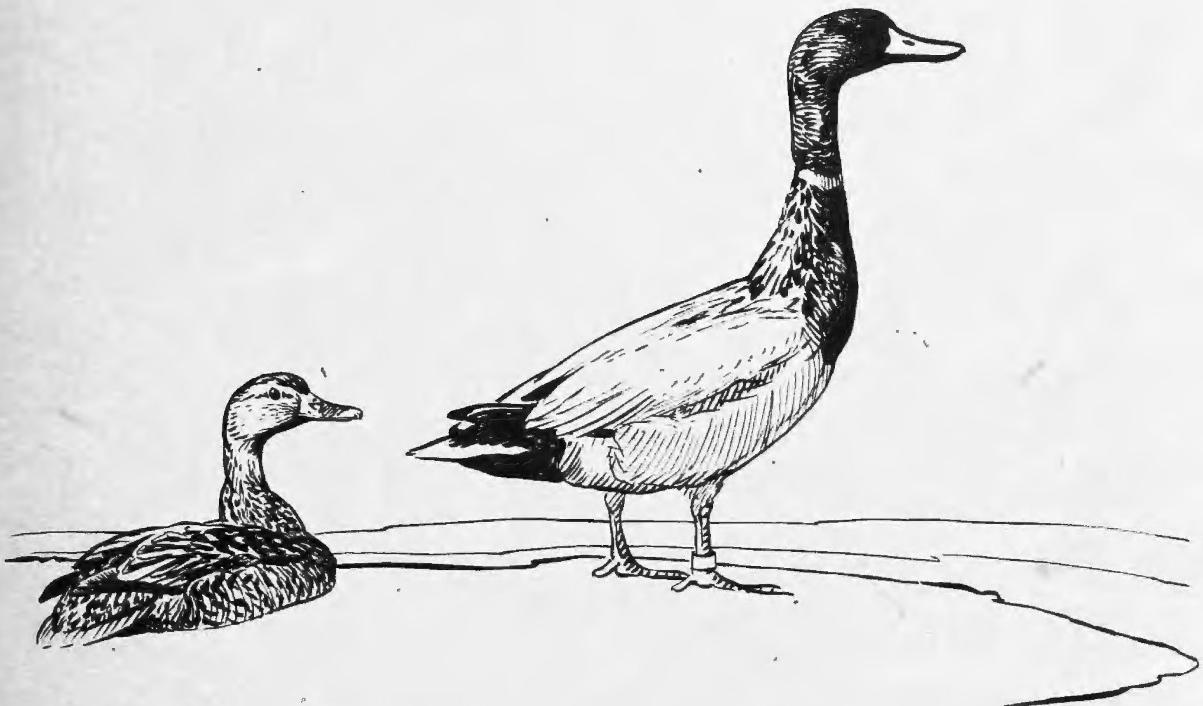
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WATERFOWL STATUS REPORT 1961



UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Bureau of Sport Fisheries and Wildlife

SPECIAL SCIENTIFIC REPORT--WILDLIFE NO. 61



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WATERFOWL STATUS REPORT, 1961

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BRANCH OF WILDLIFE RESEARCH

FISH AND WILDLIFE SERVICE

SPECIAL SCIENTIFIC REPORT--WILDLIFE NO. 61

WASHINGTON • OCTOBER 1961



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WATERFOWL STATUS REPORT

1961

Each year in early August, waterfowl shooting regulations are established for the current hunting season. Information on the status of waterfowl must be available to responsible wildlife officials during the conferences leading to formulation of the regulations. This report has been compiled to provide such information.

Data concerning the current status of waterfowl are gathered by means of four major surveys:

1. Survey conducted among waterfowl hunters immediately following the season to measure the size and species composition of the kill and the effect of hunting regulations on hunter activity and success.
2. Duck wing collection survey conducted during the hunting season to obtain information on age ratios in the hunting kill.
3. Survey of wintering areas on the North American Continent in early January to measure the distribution and relative number of birds remaining after the shooting season.
4. Survey of the major continental breed-

ing areas during May, June, and July to measure size and distribution of the breeding population and the relative number of young produced.

A fifth major endeavor in recent years has been banding, particularly of young birds on the breeding areas. The purpose of this banding is to establish relationships between breeding ground and harvest area so that data from breeding ground surveys can be properly associated with the four Flyways for management purposes.

Results of the winter and breeding ground surveys are summarized as forecasts of anticipated changes in the relative size of the 1961 fall flight of ducks, geese, brant, and coot in each of the four Flyways in the United States.

Inasmuch as waterfowl management in the United States is based on the Flyway concept, this report is organized accordingly. For purposes of this report, the four Flyways have been extended beyond the International boundaries of the United States to include breeding and wintering grounds of waterfowl most closely associated with the Flyways.

SCOPE OF INVESTIGATIONS AND METHODS USED

WATERFOWL KILL SURVEY

Each year, immediately after the shooting season, the Bureau of Sport Fisheries and Wildlife, U. S. Fish and Wildlife Service, carries out a mail-questionnaire survey among waterfowl hunters. The purpose of this survey is to estimate the size of the waterfowl harvest and the amount of hunting; and to provide information on the relationships among harvest, hunter

activity, and regulations, under changing conditions. This survey was inaugurated during the waterfowl hunting season of 1952-53.

Principal objectives of the 1960-61 survey were to obtain estimates for each Flyway of the--

1. Total number of ducks, geese, and coots shot, including those that

were lost as well as those that were retrieved.

2. Number of people, adults and juniors, who planned to hunt (potential hunters).
3. Number of people who did hunt (active hunters).
4. Average number of days active hunters were in the field hunting.
5. Species composition of ducks and geese in the waterfowl bag.

Additional information on the proportional periodic distribution of the duck bag and the percentage of hunters participating during the different parts of the season has been recorded by Atwood and Wells, Jr. (1961).¹

The sampling system for the survey is based upon post offices where Migratory Bird Hunting Stamps are sold, because there exists no listing of waterfowl hunters that might be sampled. Within each State, a series of sales outlets at post offices is selected at random. For sampling efficiency, the post offices are grouped in two categories: those with single sales outlets (usually in smaller towns) and those with multiple outlets (usually in larger cities), and each category is sampled separately. The postmaster at an outlet selected is asked to give an address card to each person who buys a Migratory Bird Hunting Stamp; this postage-paid card is to be filled out and mailed. The card requests the stamp buyer's name and address, number of stamps bought, purpose of purchase (hunting, stamp collecting, or resale), and names of junior hunters (under 16) living in the same household who are expected to hunt during the current season. Hunters who mail these cards as requested, and junior hunters listed on the cards, receive the questionnaire. The number of sampling outlets used and the number of questionnaires mailed and returned are shown in table A-1 (p. 43).

Estimates of total kill are made on the basis of hunter responses and the sales volume of stamps, by State. For kill estimates to be available by early August, the July through March summaries of stamp sales supplied by the Post Office Department must be used, but they are substantially the same as the final sale figures that are available later.

The information requested from each

hunter includes, in part, the total bag (by ducks, geese, and coots), dates hunted and the bag for each date, and the species composition of the kill.

Certain minor parts of the 1960-61 survey are known to be unreliable and are so designated in the tables. Through a clerical error undetected until too late for correction, distribution of the eastern and western forms of the questionnaire was somewhat mixed. Judging from a sample of the responses, the eastern form went to more than 99 percent of the hunters questioned in the Pacific Flyway and to about 77 percent in the Central Flyway, while the western form went to about 61 percent in the Mississippi Flyway and to about 15 percent in the Atlantic Flyway. Correct forms went to the others. The two questionnaires are identical in most characteristics, therefore for most purposes this mistake probably had no effect. However, the eastern form (received by most western hunters) did not list the cinnamon teal and the western form (received by so many hunters in the Mississippi Flyway) did not list the black duck. Very likely the major decreases recorded for the two species reflect these omissions. Other differences are that the western form lists the cackling goose and the black brant, while the eastern form lists, instead, the Hutchins's goose and the American brant.

Accuracy of the data in this report is affected both by reporting bias (misreporting and differential nonreporting) and by sampling error. Reporting biases tend to exaggerate the estimates of hunting activity and kill, and corrections are made by methods that have been employed for several years.²

The species composition of the kill is recorded as reported by hunters and compared with the species composition estimated independently from the wing collection survey (table A-2, p. 43). Agreement between the results of these two surveys is encouraging.

In general, the statistical reliability of the report is greater for areas with the larger numbers of outlets sampled and higher

¹See Literature Cited, page 40.

²These errors and methods for making the corrections are partially described in two papers by Atwood (1956, 1958). A mimeographed description of the methods used also is available.

hunter numbers and kills, and for species where the larger bags are recorded over wider areas. Inversely, the statistical reliability of the report is known to be consider-

ably less where fewer outlets, fewer hunters, or lower kills are involved, or where hunting for a species is concentrated at relatively few points.

WING COLLECTION SURVEY

Data supplied by Aelred D. Geis
and Samuel M. Carney, Bureau of
Sport Fisheries and Wildlife

In 1958, the Bureau of Sport Fisheries and Wildlife began investigating the possibility of determining the age, sex, and species composition in the duck kill by means of detached wings collected through the mail from a representative group of hunters. A small-scale pilot study in Minnesota indicated that hunters would cooperate to a degree that ensured the feasibility of this approach. At the same time a method was developed for determining with more than 95-percent accuracy the age and sex of mallards from wings (Carney and Geis, 1960).

During the 1959-60 hunting season a duck-wing collection survey was conducted in all States in the Mississippi Flyway. In the Central, Pacific, and Atlantic Flyways, arrangements were made to collect samples of wings in certain harvest areas. At the same time techniques were developed for determining the age and sex of most of the other more common species of ducks. Details of the procedure followed and the results obtained in the survey have been summarized elsewhere (Geis and Carney, 1961).

In 1960, the wing collection survey was expanded to include all States in the Atlantic and Mississippi Flyways and was continued in the other Flyways in the same selected areas as in 1959. Hunters from whom wings were solicited were selected from respondents to the 1959 mail-questionnaire survey who were over 15 years old and had reported bagging at least one duck. An attempt was made to draw samples of waterfowl hunters that were distributed geographically within a State in the same proportions as all waterfowl hunters in that State. To accomplish this, it was necessary

in some States to contact successful adult respondents to the 1959-60 wing collection survey and hunters who had reported shooting a bird that had been banded outside of their State.

The number of hunters contacted and number of wings received in the 1959-60 and 1960-61 hunting season wing collection survey are shown in table B-1 (p. 55).

Immediately before opening of the hunting season, hunters in the Atlantic and Mississippi Flyways were sent supplies of business-reply envelopes and were asked to return one wing from each duck they killed throughout the waterfowl hunting season. A post card addressed to the Bureau was included with each package of envelopes for the use of those hunters who might need additional envelopes.

All wings received were kept frozen until they could be examined. Teams of both State and Bureau biologists assembled at the freezer-storage points and identified the species, age, and sex of the bird each wing represented. The accuracy of this work was carefully verified. A full report on the 1960-61 hunting season wing-collection survey will be made in a separate paper.

The wing-collection survey is a relatively new method for measuring waterfowl production, and many phases of the survey are at present in the process of evolving from the experimental and developmental stage to the operational stage. However, it is hoped that the information gathered thus far is the beginning of a historical series that will portray annual changes in production with considerable accuracy and will facilitate improvements in July aerial production-survey techniques.

WINTER SURVEY

The annual winter survey to obtain information on waterfowl wintering conditions and distribution covered all major wintering areas of the United States, Canada, and Mexico. In the State of Alaska and in Mexico the Bureau of Sport Fisheries and Wildlife organized and conducted the survey. In the rest of the continental United States, the Bureau organized the survey, but much of the field work was done by personnel of the various State conservation departments. The U. S. Department of Defense and the U. S. Coast Guard supplied the aircraft used in aerial counts in many areas. In Canada, the survey was organized by the Canadian Wildlife Service and field work was done by the Service and the Provinces.

The wintering areas were surveyed by means of boats, cars, and aircraft, with most of the important areas being censused from the air. Aerial photographs were taken to supplement visual estimates in some of

the more important concentration areas, particularly in California.

It must be emphasized that the number of birds observed and recorded during the winter survey does not constitute an estimate of the total population in any Flyway or for the continent as a whole: all wintering areas of North American waterfowl are not surveyed and inherent variables exist in the estimating technique. However, with consistent coverage from year to year in the bulk of the wintering areas, it is believed that yearly data for most of the major species can be used to establish broad trends in population size. In addition, the winter survey data have great value for determining the use made of various wintering areas and the change in distribution from year to year in response to changing weather and habitat conditions.

Table C-1 (p. 61) summarizes participation by the various groups in the 1961 winter survey.

BREEDING GROUND SURVEY

Surveys are conducted each year on the waterfowl breeding grounds for the purpose of estimating the relative size of the fall flight from each of the breeding areas. Two coverages of the breeding areas are required to obtain the necessary information: the first coverage is made during May and June to measure the distribution and relative size of the breeding population; the second during July to forecast the relative number of young that would be produced. In July it is necessary to make a preliminary estimate or forecast of the number of young that will be produced, since at the time field work must be terminated to have the data available for use in setting the shooting regulations, only a part of the season's young will have hatched. The production survey, therefore, consists of a measure of the number of broods on the water at the time of the survey plus a measure of weather, water, and other conditions that affect or reflect production success following the survey period.

The bulk of the important waterfowl breeding areas in Alaska, Canada, North Dakota, South Dakota, and Minnesota are surveyed from the air. Statistically designed sampling techniques and similar methods of collecting and analyzing data are used

throughout these areas. In addition to the areas mentioned, approximately 22 of the Northern States conduct breeding-ground surveys. Methods vary somewhat among these States, although in States with important numbers of breeding ducks the methods are similar in most respects to those employed in the Dakotas, Canada, and Alaska.

In recent years, aerial crews have sampled approximately 2,375,000 square miles of the best duck breeding habitat on the North American Continent. The only important duck breeding areas that are not being censused currently are those in eastern Ontario, Quebec, and Labrador, for which adequate census techniques have not yet been developed.

The aerial crews count the birds on somewhat less than 1 percent of the total breeding area. This is sufficient coverage to reduce sampling error to less than 20 percent of the average population density in most survey areas, and to much less than 20 percent when considering the breeding range as a whole.

The results of the breeding-ground surveys are presented as indexes. When conducting aerial surveys of breeding birds or of broods, not all birds present are

seen by the aerial crews. Methods of measuring the proportion of birds present that are seen are being developed, but these studies have not progressed to the point where visibility factors can be determined throughout the breeding range. Since there is no attempt to estimate the number of birds not seen, the indexes presented in this report are based on birds actually seen, and it is emphasized that they do not constitute estimates of the total numbers present.

Results of the May survey of the breeding population and of the later production survey when combined form the basis for forecasts of changes in the relative size of the fall flight of ducks and coot in the three Flyways from the Mississippi Flyway west-

ward. It is not possible to rely on the breeding-ground information to the same degree in the Atlantic Flyway as in the other Flyways, primarily because of the lack of survey data from Quebec and Labrador, which are important contributors of birds to that Flyway.

The breeding-ground surveys are cooperative in nature. The Bureau of Sport Fisheries and Wildlife, the Canadian Wildlife Service and the Provincial game branches, Ducks Unlimited, and the State conservation agencies combine their equipment and manpower to conduct the necessary surveys throughout the vast extent of the waterfowl breeding range.

BANDING

Banding is a powerful tool in waterfowl research. It provides information on the relation between production and wintering and harvest areas which makes possible the prediction of the influence that the population changes, determined from the breeding ground and wintering ground surveys, will have on waterfowl using various harvest areas. Band-recovery data also provide valuable information on survival rates, effects of regulations on the kill, importance of hunting as a mortality factor, and the relative shooting pressures to which various ages, sexes, and species are subjected.

Very little banding data are available for inclusion in this status report due to complications associated with the loss of records resulting from a fire on June 13, 1959, at the Patuxent Wildlife Research Center. Each of the major banding programs will be discussed, however, and a few pertinent examples of data summaries given. It is anticipated that status reports in future years will include current results from each of these banding programs.

BREEDING GROUND BANDING

The primary objective of the breeding ground banding program is to determine distribution of the hunting kill of birds produced in each major breeding area. To accomplish this objective, it is necessary to confine banding to birds known to have been produced near or to breed near the

locality of banding. Therefore the banding program has emphasized the banding of "locals," or the immature birds that are too young to fly.

The following table illustrates the information obtained from this program. It shows the distribution of direct (first hunting season) recoveries from mallards banded as flightless immatures (locals) in the three highly important Prairie Provinces of Canada. This table also shows why the results of banding frequently cannot be logically segregated by Flyways, since it is usual for recoveries from a given breeding area to be taken in two or more Flyways.

Distribution among Canada and the four Flyways in the United States of direct band recoveries from mallards banded as flightless young, 1953-60

Harvest area	Distribution (percent) of recoveries from bandings in--		
	Alberta	Saskatchewan	Manitoba
Canada-----	55.8	39.9	52.9
Pacific Flyway-----	21.7	4.0	0.0
Central Flyway-----	11.5	23.3	11.2
Mississippi Flyway-----	10.8	32.2	34.8
Atlantic Flyway-----	0.1	0.7	1.1
All areas-----	99.9	100.1	100.0
Total recoveries----	658	2,239	187

Note.--A few birds banded before 1953 may be included in the data.

PRESEASON BANDING

The prehunting season banding program was started on a continent-wide basis in 1959 with emphasis on the banding of mallards and black ducks. Its objective is to band a sufficient number of free-flying birds to obtain at least 50 (and preferably 100) direct recoveries of both immature and adult birds from each of a series of banding stations distributed across southern Canada and northern United States. It is the best type of banding to obtain information on--

1. Annual rates of hunting kill.
2. Annual mortality rates.
3. Importance of hunting as a mortality factor.
4. Relation between hunting regulations and proportion of waterfowl population harvested.
5. Relative degree to which various ages, sexes, and species are taken by hunting.

Information on the relative degree to which various ages are taken by hunting is especially important since it permits age ratios in the population to be determined from age ratios in the hunting kill as measured by the wing collection survey. For example, based on a comparison of recovery rates from adults and immatures in the Mississippi Flyway, it was possible to estimate from the age ratio observed in the kill of 0.77 immatures per adult during the 1959-60 hunting season that the age ratio in the population before the season was 0.53; while the age ratio in the kill of 1.84 immatures per adult during the 1960-61 hunting season represented a preseason ratio of 1.30 immatures per adult. Unfortunately, reliability of the data resulting from the pre-season banding program thus far has been questionable, because of an inadequate number of birds banded at most stations and the poor geographic distribution of the banded sample, due largely to inadequate preseason banding in Canada. Results of the preseason banding program in 1959 and 1960 are discussed fully in another report (Smith and Geis, 1961).

WOOD DUCK BANDING

The cooperative wood duck banding program was started in 1959 by the Mississippi Flyway Council because of the lack of information about this important duck. To

complete the picture, the Atlantic Flyway States renewed their efforts in the banding of wood ducks. Of primary concern in the wood duck banding program is an appraisal of the importance of hunting as a mortality factor and the effects that hunting regulations have on size of the kill. Another major objective of the wood duck banding program is to determine the feasibility of making indirect population estimates based on banding data, in conjunction with information from wing collection and waterfowl kill surveys.

Progress made in 1959 and 1960 in the wood duck banding program was reviewed recently (Kaczynski and Geis, 1961). In 1960, cooperators in the United States and Canada banded 10,563 wood ducks, a 49-percent increase over the number banded in 1959. Wood ducks banded in four States, Wisconsin, Illinois, Ohio, and Iowa, provided 76 percent of the 7,625 banded in the Mississippi Flyway, while two States, New York and Vermont, provided 61 percent of the 2,561 banded in the Atlantic Flyway. Almost all of the bandings were in late summer and early fall.

The possibility was explored of using the data obtained from the 1959-60 wood duck banding program, in conjunction with other information, to determine importance of hunting as a mortality factor, effects of regulations on the kill, distribution of the hunting kill, and size of the prehunting season population. Unfortunately, due to small sample sizes and the absence of banded samples in important areas, present information cannot be regarded as reliable. The wood duck banding program shows promise, however, of contributing important information of management significance.

POSTHUNTING-SEASON WINTERING GROUND BANDING

Banding in wintering areas after close of the hunting season provides information on distribution of the hunting kill of various wintering populations among the various harvest areas. Thus, it aids in interpreting winter inventory counts in much the same way that breeding ground banding permits interpreting breeding ground surveys. Also, it provides much the same type of information outlined for the preseason banding program, except that the accuracy with which these determinations can be made is less-

sened because of the greater time interval between the time of banding and of recovery, during which nonhunting mortality can occur. Many species cannot be banded during a preseason banding program; therefore, wintering ground banding provides the best source of information on harvest rates, effects of regulations on the hunting kill, and similar information. The value of wintering ground banding is illustrated in the table which follows by the recovery rates from canvasback banded in New York during the winters and springs of 1955 through 1960.

The 6.8 percent recovery rate during the 1955-56 through 1957-58 hunting seasons is an index of the rate of kill before special regulations for the canvasback. The marked increase in the recovery rate in the 1958-59 hunting season was due to an unusually late closing date in New York that resulted in an intense hunting pressure on the

First-hunting-season band recovery rates of canvasbacks banded after the hunting season in New York

Time of banding	Number banded	First-season recovery rate (percent)
1955-57-----	7,015	6.8
1958-----	2,431	12.1
1959-----	910	1.1
1960-----	162	0.0

"canvasback lakes," which remained unfrozen. The low recovery rates during the 1959-60 and 1960-61 hunting seasons reflected the daily bag limit of one canvasback in 1959-60 and the complete protection of the canvasback in the United States during the 1960-61 season.

PACIFIC FLYWAY WATERFOWL KILL SURVEY

An estimated 2,246,065 ducks were bagged during the 1960-61 waterfowl season in the Pacific Flyway (table A-3, p. 44), approximately 5 percent more than during the 1959-60 season. An additional 359,779 ducks were killed but not retrieved--a 22-percent increase--and the total kill (retrieved and unretrieved) of 2,605,844 ducks implies a 7-percent increase in the kill over the previous season.

Mallards made up 32 percent of the duck bag; pintails, 22 percent; American widgeon, 15 percent; green-winged teal, 11 percent; and shoveler, 7 percent. These five species constituted 87 percent of the total bag reported.

The retrieved kill of shoveler, pintail, and American widgeon indicated pronounced increases over that of the previous season. Among the less-dominant species of ducks, the largest bag increases occurred in ring-necked duck and scaup. As expected with a closed season on redhead and canvasback, extreme decreases occurred in the numbers reported shot, although some kill was indicated. Certainly, the 96-percent decrease in the reported bag of cinnamon teal resulted largely from the eastern form of the questionnaire (in which cinnamon teal was

not listed) being sent to western hunters (see page 2).

An estimated 259,903 geese were bagged in the Pacific Flyway, a 21-percent increase over the kill in the 1959-60 season; and an additional 45,355 geese were shot but not retrieved, a 22-percent increase. Canada geese (31 percent), snow geese (30 percent) and white-fronted geese (24 percent) comprised 85 percent of the geese bagged in the Flyway.

An estimated 59,476 coots were retrieved in the Pacific Flyway (table A-3), suggesting possibly a slight increase from the past year, although the total kill (retrieved and unretrieved) remained quite stable.

The total number of potential hunters decreased only 2 percent from the previous season, although the number of active hunters decreased 4 percent and the average number of times they hunted decreased 5 percent (table A-4, p. 45).

With a decrease in both number of hunters and times they hunted, the increase in duck kill which occurred was entirely the result of an increase in daily bag from an average of 1.99 during the 1959-60 season to 2.26 in 1960-61.

WING COLLECTION SURVEY

There was no mail collection of wings from hunters in the Pacific Flyway during either the 1959-60 or the 1960-61 hunting season. Mallard and pintail wings were collected by Bureau and State personnel at a number of harvest areas within the Flyway, however, during both seasons to obtain information to supplement that obtained directly from hunters in the Mississippi

and Atlantic Flyways. Wings from both species indicated a general increase in the ratio of young to adult birds in the kill during the 1960-61 hunting season, suggesting that, particularly for the pintail, production was higher in 1960 than in 1959. The results of these collections are summarized in table B-2 (p. 55).

WINTER SURVEY

FACTORS AFFECTING SURVEY

Data collected during the 1960 and 1961 winter surveys in the Pacific Flyway are reasonably comparable, although inclement weather and fog conditions in the Central Valley of California and in western Washington delayed completion of the 1961 survey as scheduled. Continuous fog in southeastern Washington made it necessary to cancel aerial flights along the Snake River, and it was not possible to take aerial photographs of concentration areas in the Central Valley of California. The total wintering habitat is not completely covered in Alaska and British Columbia; weather conditions during early January make aerial surveys difficult in these areas. Feasibility of comparable coverage each year determines the areas selected for census. In the rest of the United States and in Mexico, an effort is made to cover all important concentration areas completely.

POPULATION TRENDS

The total number of ducks in the Pacific Flyway changed very little in 1961 as compared with 1960, and no significant changes occurred among any of the important species. Geese increased 24 percent over

their numbers of the previous year and reached the highest numbers recorded in the past 13 years. All species of geese increased, but Canada and snow geese increased more than white-fronted and cackling geese. Although the number of Ross's geese recorded during the survey decreased, special censuses have shown increases in this species in recent years. During the mid-February survey of Ross's geese this year, 23,050 birds were recorded--the highest figure tallied since special surveys for this species were begun in 1955. Coot increased considerably and nearly reached the peak numbers of recent years, recorded in 1954. Black brant increased for the second consecutive year and the downward trend in its numbers between 1952 and 1959 seems to have been reversed.

The winter survey data for the Pacific Flyway are presented in tables and figures in appendix C. Table C-2 (p. 62) presents comparative data for 1960 and 1961, by species. Tables C-3 and C-4 (p. 63) and figures C-1 through C-5 (p. 70-74) give comparative data for the past several years. As explained elsewhere, there are problems concerning comparability of coverage during the period which makes certain adjustments necessary before population trends can be established.

BREEDING GROUND SURVEY

ALASKA

Data supplied by Peter E. K.
Shepherd, Alaska Department of
Fish and Game, and Ray Woolford,
Bureau of Sport Fisheries and
Wildlife

WEATHER AND WATER CONDITIONS

The season was somewhat later than normal in interior Alaska north of the Alaska Range, but earlier from Bristol Bay north along the Bering Sea coast. This is an unusual condition, inasmuch as the western coast seldom breaks up earlier than eastern Alaska due to the influence of the offshore pack ice. The season was not seriously late, however, and advanced rapidly following breakup.

Many ponds and lakes in interior Alaska have the lowest water levels observed in the past 7 years, following many winters of light snowfall. Although one does not think of a water shortage in the Arctic in terms of total number of ponds or total acres of water, habitat may deteriorate seriously as the water table lowers even as in the Prairies. This is one of the factors affecting production that is being intensively studied on the upper Yukon where the low water level is most pronounced.

At about the peak of the dabbling duck hatch, heavy persistent rain blanketed most of Alaska raising the rivers to near-flood stage. Water in the upper Tanana near the Yukon border was reported to be the highest recorded since 1923. There is little or no evidence that many nests were destroyed but the average brood size for some species is smaller than normal, indicating mortality among newly hatched young.

On June 30 a severe storm struck the Yukon-Kuskokwim Delta causing extremely high tides and widespread inundation of the black brant nesting grounds. However, the first brant nests hatched June 16 and the peak of the hatch occurred June 22. Of the 115 successful nests under observation, 90 percent were hatched by June 27; thus, about 50 percent of the young were a week old or older at the time of the storm. It is not unrealistic that this storm caused some losses from exposure, nest flooding, and

indirectly from predation; however, no data are available to assess possible losses.

BREEDING POPULATION INDEXES

There has been a modest increase in game ducks with scoters, eiders, and old squaw no more than maintaining last year's breeding population. Only about one-third as many canvasback were counted as last year. Ground studies have since proved the aerial survey to be inaccurate in this respect, however. Biologists in the Tetlin, Fort Yukon, and Minto areas, which contain most of Alaska's canvasback, report considerably more canvasback, redhead, and blue-winged teal in all three areas than last year. Apparently they were late migrants moving into Alaska after the aerial survey was completed in the eastern part of the State on May 23. Widgeon, on the other hand, are reported to be fewer than last year in the upper Yukon River Basin. The widgeon has a very low visibility factor from the air; hence, an aerial survey is a poor indicator of total widgeon abundance and perhaps gives an inaccurate population trend for this species from year to year.

In general, the lower-density stratum II showed the biggest increase, doubling the 1960 population. At first glance, this might indicate that the duck population has been well below the carrying capacity of the northern habitat in the past several years. Since 1956 comparable coverage has been given Alaska annually, and the population index has slowly but steadily increased from about 1,160,000 ducks to a high of 1,763,000 in 1961, or roughly 50 percent. Whether this increase reflects an influx of ducks from the deteriorating habitat to the south, an actual increase of resident birds, or increased ability to count birds on the part of the observers has not yet been determined. The fact remains that much of the northern habitat still appears to be sparsely populated.

Comparison of previous black brant studies on the Yukon-Kuskokwim suggests a substantial increase inbreeding populations of this species. An intensive search of a nesting study area established in 1951 by the Fish and Wildlife Service revealed a remarkable increase in nest density. In

addition, a series of nest sampling plots on another previously established area showed a proportional increase in nests. Of note is the observation that although black brant nest densities showed over a 200-percent increase, the cackling goose segment of the nesting population remained nearly the same.

In addition to the standard coverage in Alaska, the survey in 1961 was extended into Canada covering an area within a 200-mile radius of Whitehorse, Yukon Territory. Most of this area is mountainous, but a surprising number of ponds and lakes are in the river valleys and at the lower elevations. Breakup was reported to be late this year (corresponding with eastern Alaska) with no more than a very tenuous float operation possible before May 20 although the rivers were all open and there was enough open water around most of the ponds for the ducks to be well dispersed. Twenty-eight 16-mile transects were flown in this area for a mean density of 15.0 ducks per square mile. The total amount of habitat has not been measured pending receipt of adequate maps. Thus, a population index has not yet been derived. The species composition ran high to scaup (50.0 percent) and low to pintail (4.1 percent); mallard (6.6 percent), bufflehead (8.8 percent), scoter (20.0 percent), and goldeneye (2.5 percent), comprised the remainder.

Breeding population data are presented in tables E-1, E-2, and E-3 (p. 83, 84).

PRODUCTION INDEXES

Production studies were conducted during July on four sample areas located at Tetlin, Fort Yukon, Minto Lakes, and Kashunuk River. The data collected at these study areas are presented in tables F-1 through F-3, (p. 105, 106).

The total broods listed for each year on the Tetlin and Fort Yukon study areas are not directly comparable. In 1960, the count is the total for the summer whereas in 1961 the count does not include many of the scaup and other late nesters. The total number of broods in 1961 will be much higher than in 1960 but may not be as high as the exceptional production of 1959. The

lateness of the season is illustrated by the following comparative brood counts. On July 19, 1960, in the Tetlin area 57 broods were counted on one lake. Forty-two percent were class I, 44 percent were class II and 14 percent class III. On July 21, 1961 on the same lake 42 broods were counted as follows: 62 percent, class I; 36 percent, class II; and 2 percent, class III.³

Comparative brood counts have been made on certain key lakes for the past several years. However, the high water levels coinciding with the peak of the dabbling duck hatch resulted in a marked redistribution of the population. There is uniform agreement among the biologists working independently that the total number of broods is well above last year's level, but it is impossible to give a quantitative estimate of how much.

A compilation of black brant nest and brood data for 1951, 1954, and 1961 from the Kashunuk River appears in table F-4. The 1951 broods were slightly the largest at hatching and continued to remain proportionately the largest. However, it will be noted that this statistic was based on 288 broods, whereas 454 broods were counted in 1961. Again, in 1954 the brood size is smaller than in either of the other 2 years; furthermore, the total number of broods counted was only 159. Because these brood counts and nesting statistics were gathered from the same area with essentially the same methods used, they seem fairly comparable.

CONCLUSIONS

In view of the small increase in the breeding population and the estimate that the number of broods will be larger than last year, it is concluded that there will be an increase in the fall flight of ducks from Alaska as compared with 1960. Increases in both breeding population and production of black brant were recorded and a moderate improvement in the fall flight of this species is expected also.

³For an explanation of age classification of ducklings see Gollop and Marshall (1954).

NORTHERN ALBERTA, NORTHEASTERN BRITISH COLUMBIA, NORTHWEST TERRITORIES, AND YUKON

Data supplied by Robert H. Smith,
Bureau of Sport Fisheries and
Wildlife

WEATHER AND HABITAT CONDITIONS

The spring season was unusual. Winter lingered tenaciously until well into May and then spring broke with a rush creating the impression of a mild, early season. When we arrived on the survey area, the phenology was well advanced; ice was gone or in the process of breakup except for the very largest, deepest lakes; the birch and aspen leaves were well out. The weather was warm and clear, and remained that way except for a few fast-moving fronts. This created a serious forest fire condition and many fires were burning out of control in northern Alberta and northeastern British Columbia.

On the southern three transects, which lie on the fringe of agricultural land, surface water was practically nonexistent but water conditions improved from west to east except for the larger ponds and lakes. North of this line, approximately 57° north latitude, surface water was higher than last year due to a heavy snow pack and quick runoff. Small rivers and creeks were out of their banks and *Carex* sloughs and meadows were inundated. This situation prevailed to about the Arctic Circle where the snowpack was light and runoff small. Consequently, the short Arctic drainages were never inflood. The Mackenzie River, draining the area of heavy snowpack, was the highest it has been since 1936. The delta was completely inundated from hill to hill, flooding the village of Aklavik. This flood did not begin to recede until June 7 and a week later it was still over the low banks. At this time the water started to rise again at Norman Wells. There was serious flooding on the Athabasca Delta, also.

BREEDING POPULATION INDEXES

The most southerly strata showed the largest increases in the number of ducks, particularly in mallards and pintails. Farther north in the typical northern forest-tundra habitat, duck densities thinned out

until in the last three strata decreases were recorded. Apparently, as displaced prairie ducks moved northward from the drought area they stopped at the first available water. Thus, when spring came with a rush, these ducks were already established in the more southerly areas.

Over the entire survey area an increase in the aggregate of all ducks of 23 percent was recorded. An inspection of table E-4 (p. 85) will reveal that all species increased in number except scoters, canvasback, bufflehead, and ring-necked duck. These increases approach but do not equal the 1959 record when there was a mass exodus to the north from the prairies (table E-5). Changes in status of species such as canvasback, redhead, ruddy duck, and gadwall are probably not significant due to their small numerical value in our areas. This applies to coot as well.

Also, we do not place too much confidence in the figures for Canada and white-fronted geese because the sampling plan emphasizes ducks rather than geese. According to our records the number of Canada geese decreased slightly while white-fronted geese and swans increased. Our total estimate of snow geese at the mouth of the MacKenzie River was 4,800, including the nonnesting flocks; but the nesting colony was adversely affected by the flood. There were a number of active nests still going, but a larger number had been flooded out and washed away. The active nests were barely above water level and even they may have sustained some flood damage. Conversely, there was good nesting and early, large clutches of eggs at the mouth of the Anderson River with no high water.

PRODUCTION INDEXES

Although the potential number of breeding ducks increased considerably within the survey area, the first brood survey conducted during the third week in July revealed a 50-percent reduction in number of broods as compared with counts made at the same time and over the same routes in 1960. A second coverage of the routes, completed on August 14, revealed a considerable increase in number of broods as compared with the first coverage, but the total was still 9 percent below comparable figures for 1960. Also, nearly all of the new broods which accounted for the increase were either scaup

or scoter. It is concluded that production success among early nesting species was considerably less than last year while success among late nesters was about normal.

CONCLUSIONS

It is expected that the increase in number of adults will approximately balance a decrease in production resulting in a fall flight from the area about equal to that of 1960.

SOUTHERN ALBERTA

Data supplied by G. Hortin
Jensen and Floyd A. Thompson,
Bureau of Sport Fisheries and
Wildlife

WEATHER AND WATER CONDITIONS

Alberta experienced a very mild winter with factors unfavorable to conserving moisture reserves in the soil, which led to the early disappearance of a very light winter snowfall. The month of April was cool and windy with some soil drifting. Average precipitation was 17 percent below normal for April. On May 1, dust was following the plows along our survey route over the Milk River ridge. Signs and reports showed a deficiency of soil moisture.

The partial improvement in water conditions during the spring of 1960 did not continue through that summer. July 1960 gave the lowest index for ponds that has been experienced. With a mild winter and low precipitation, the spring of 1961 began with our survey registering the next lowest number of ponds for any year; only spring of 1959 had a lower index. All strata and the Province record sizeable decreases from the 1960 levels and from the 10-year average. Only the three most northern transects in the parkland had May water conditions equalling last year's.

Water disappeared at an accelerated rate during late May, June, and early July. Moisture was confined to isolated thunder showers and the rainfall was of little consequence. July, however, moderated in temperature and most of the month was in the seventies. The first general rain of the

summer season fell at the end of the month and rain was general through the western half of the survey area. A rainfall of more than 3 inches was recorded at Calgary and Edmonton and stabilized water in the remaining potholes, ensuring sufficient water for the broods on the water. Water indexes are presented in table D-1 (p. 77).

BREEDING POPULATION INDEXES

Breeding populations continue to decline, the prairie habitat showing a marked decrease. Stratum A registered a 43-percent reduction in breeding populations and stratum C a 53-percent reduction. The well-watered, extreme-northern parklands attracted enough waterfowl to maintain the status of the parklands at the 1960 index level. The southern parklands, however, registered decreases similar to those of the short-grass prairies. Province-wide, the breeding-pair index declined 21 percent from last year.

A similar downward trend was noted in the comparisons with the 10-year averages. Decreases of 40 percent and 52 percent were recorded for strata A and C, respectively. The Province index was down 15 percent. Only stratum B was above the 10-year average, showing a 21-percent increase.

The waterfowl breeding populations are tabulated by species, stratum, and year beginning on page 87 (tables E-6 and E-7).

Compared with 1960, all species of dabbling ducks, except blue-winged and green-winged teal, had reduced indexes. The reduction was around 20 percent for mallard, baldpate, shoveler, and gadwall. The pintail, with the index reduced 54 percent, was the most severely affected species of waterfowl. Scaup maintained its status equal with last year's. Numbers of other divers were small and erratic to a degree. It is significant that no further decrease occurred in canvasback and redhead. As is to be expected, the largest declines were recorded in the strata of the short-grass prairie, where drought conditions were most severe.

The 10-year average shows a 57-percent decline in pintail indexes. The mallard index dropped 12 percent below the average for the first time since inception of the survey; however, mallard indexes held up in the parklands. The mallard has assumed

dominance in all strata and will be the most abundant duck in Alberta this year, as has been true since the early fifties. Before 1953 the pintail was the leading duck in Alberta.

PRODUCTION INDEXES

Breeding waterfowl were successful only in areas where water quality ensured suitable habitat during the nesting and brooding season.

Even though the habitat has become somewhat more restricted, the brood index for 1961 was 16 percent higher than for last year. As is to be expected, significant losses of 27 percent and 46 percent occurred in strata A and C, respectively. In stratum B a 50 percent increase over last year was recorded (table F-5, p. 107).

With the extreme drought causing the water to recede rapidly from existing shorelines, conditions for seeing broods may have been very favorable. Previous years have not presented this advantage to the same degree. For this reason, we feel that this breeding season is no more successful than that of 1960. As such, they both would rank as our years of lowest productivity.

The late-nesting index was very low. Adult birds seemed to have deserted the survey area almost completely by the brooding season, and renesting appeared to be rare. The late-nesting index was 50 percent below 1960 and markedly below any year during the period 1953-1960 (table F-6, p. 108).

Coots were found only where water conditions were good to excellent. Hence, coot indexes were low compared with the years before the drought. Indexes for strata A and C were very low; with good water conditions in the northern parklands, the indexes were relatively high. The 1961 coot index was 54,000--49 percent below the 1957 index, a nondrought year, but 69 percent above last year's, a low year. It appears that coots have made a partial recovery largely because of favorable conditions in the northern parklands.

CONCLUSIONS

Due to decreases in breeding population, to a smaller number of water areas resulting from the drought, and to reductions in pro-

duction, it is estimated that the fall flight from southern Alberta will be smaller than last year's and will be the smallest since breeding-ground surveys were initiated.

WASHINGTON

Data supplied by Robert G. Jeffrey,
Washington Department of Game

WEATHER AND WATER CONDITIONS

Water levels have been good in nearly all duck production areas of the State. Flooding probably caused some nest destruction in northeastern Washington and in western Washington along the Columbia River. Weather during the nesting and early brood season has been warm and favorable to a high production.

BREEDING POPULATION AND PRODUCTION INDEXES

Breeding pair counts and early brood work indicate that all areas of the State will show an increase in waterfowl production. Canada geese were up 7 percent. Mallards showed a moderate increase in most areas, and blue-winged and cinnamon teal increased greatly throughout the State. The coot breeding population in eastern Washington has more than doubled. The only major species to show a decline from 1960 is the wood duck, which may be down about 15 percent. Survey data are presented in table F-7 (p. 108).

CONCLUSIONS

It is estimated that there will be an increase in the fall flight of ducks as compared with 1960 but the flight of Canada geese will remain about the same.

IDAHO

Data supplied by Idaho Department
of Fish and Game

WEATHER AND WATER CONDITIONS

The weather pattern for Idaho during the spring and early summer of 1961 was similar

to that of 1960. Snow pack was extremely deficient in southern Idaho, while timbered northern Idaho received copious amounts of winter and spring moisture, largely in the form of rain.

The drought cycle continued in southern Idaho. Shallow marsh and pothole areas dried out in early summer and probably contributed very little to 1961 duck production. Several major irrigation reservoirs would be at minimum pool by August.

Spring waterfowl movements were on schedule but lighter than normal.

BREEDING POPULATION INDEXES

Aerial trend counts were conducted on all major goose nesting areas of the State for the 7th consecutive year (table E-8, p. 88.).

PRODUCTION INDEXES

Canada goose nesting surveys were conducted for the 10th consecutive year. The indicated goose production trend is based on the number of nests and hatching success found on identical areas surveyed in the same manner each year. From 1960 to 1961, gosling production was down 18 percent for all seven units combined (table E-9). All major goose nesting units shared the drop in production and this decline occurred despite a continued upward trend in spring breeding populations.

On the six areas for which a long-term trend is available, goose production in 1961 was 6 percent below the 1954-60 average.

Two duck brood production trend routes were censused in south-central and southeastern Idaho. The routes were run twice with all classes of broods counted on the early July run and only class I broods counted on the late July run. Other brood trend routes run in the past could not be counted this year because water levels were too low to permit boat operation; on some routes, there was no water at all. Results for the one south-central Idaho canal sample and for the Camas National Wildlife Refuge route in southeast Idaho are shown in tables F-8 and F-9 (p. 109, 110).

CONCLUSIONS

Numbers of geese on Idaho goose breeding areas during the spring of 1961 were the

highest since aerial counts began in 1955; however, goose production for all units combined was considerably below that of 1960, the good goose production year, and slightly below the long-term average.

Duck production is judged to be down appreciably in Idaho due to the drought condition in the southern part of the State, which removed many shallow water areas from the habitat base. Production on permanent waters in the State was normal.

OREGON

Data supplied by Chester E. Kebbe, Oregon State Game Commission

WEATHER AND WATER CONDITIONS

Continued drouth in southeastern Oregon caused many small marshes to go dry and seriously affected water levels on the major waterfowl production areas. Very little snow fell during the winter and, although Oregon experienced a very wet spring, little of this moisture fell in southeastern Oregon where it was badly needed. A large part of Malheur Refuge and Warner Valley, two major production areas, are completely dry.

PRODUCTION INDEXES

Preliminary surveys on Malheur Refuge show Canada goose production to be down 50 percent from the previous 3-year average, mallard down 42 percent, gadwall down 85 percent, and redhead down 88 percent.

Warner Valley is almost completely dry and waterfowl production was almost eliminated. Tables F-10, F-11, and F-12 (p. 111, 112) present measurements on permanent transects elsewhere in eastern Oregon. This sampling shows Canada goose production to be up 8 percent from 1960 and up 5 percent from the average of the previous 3 years. Duck production over the sampled areas indicates an increase of 6 percent over that of 1960, but 20 percent below that of the previous 3-year average.

CONCLUSIONS

Sampling results on permanent water areas showed goose production to be up 8

percent and duck production up 6 percent from 1960. Compared with the previous 3-year average, goose production was up 5 percent but duck production was down 20 percent.

The drouth undoubtedly caused a shift of birds to permanent water areas, loading these samples. General observations, however, indicate goose and duck production changed little from 1960, but it was down considerably from 1959 when all marshes were in production.

CALIFORNIA

Data supplied by J. R. LeDonne,
F. M. Kozlik, and William
Anderson, California Department
of Fish and Game

WEATHER AND WATER CONDITIONS

For the third consecutive year, water conditions in northeastern California fell below normal. California experienced an extremely dry fall and winter and many of the meadows, small reservoirs, and lakes were dry by the first of June.

The Central Valley also received less than a normal amount of rainfall. However, since much of the waterfowl production takes place on the rice lands with controlled water, the effects of the drought conditions were somewhat minimized.

The spring was mild and migration began early. By March most of the birds had left the wintering grounds.

PRODUCTION INDEXES

The survey flights in the Central Valley were conducted on May 24 and 25, while northeastern California was flown from May 31 through June 4. Before 1960 a special early flight was made in early May to record Canada geese while the nesting season was still in progress. From the early flight the number of paired geese and the number of groups (nonbreeders) were recorded. Then on the regular breeding survey in June, the number of young birds was recorded and added to the population. This is the second year that only the June flight was made and all geese were recorded at that time. When this method is used the

number of paired geese recorded for the years 1960 and 1961 are not comparable with those shown for previous years, as only adults with young were recorded as paired in 1960 and 1961. Pairs of geese that failed to nest or lost their young are now grouped as nonbreeders. However, the figures shown in the fall population indexes are still comparable as they included all categories of geese and comprise the total population. Estimated fall population indexes by species and area are presented in table F-13 (p. 112).

A comparative summary of nesting pairs of waterfowl for the past four seasons, together with final fall populations including young and resident adults, is shown in table F-14 (p. 113). In most instances, the numbers of nesting pairs given are more accurate than the fall population indexes.

CONCLUSIONS

A 17-percent increase is estimated in the breeding pairs of Canada geese and a 7-percent increase in the total fall population. Because of the drought the geese were concentrated on refuge areas with their controlled-water conditions.

There is a 15-percent decrease in breeding pairs of ducks and 23-percent decrease in the total fall population.

The total fall population of coots shows better than a 100-percent increase--mainly due to the high increase that occurred on the rice lands of the Sacramento Valley, where the birds found good nesting conditions.

NEVADA

Data supplied by Vic Oglesby,
Nevada Fish and Game Department

WEATHER AND WATER CONDITIONS

The drought, quite severe in west-central Nevada for the past 2 years, was even more severe in 1961, when it extended over the entire State affecting all waterfowl production areas adversely. A shortage of mountain snowfall persisted through the winter and early spring months resulting in one of the poorest irrigation seasons on record. Major reservoirs are seriously depleted and April reservoir inflow was balanced by irrigation

releases. Total storage in the State as of May 1, 1961, was only 31 percent of average. Although weather was cold and rainy during April and May, the water soaked into the soil and did not contribute materially to spring and summer streamflow. These late storms retarded the nesting season several weeks.

Nearly all important waterfowl-producing marshes were dry or greatly reduced in size by July 15, 1961. The Stillwater and Carson Lake marshes in Lahontan Valley were nearly dry and marsh units at Ruby Lake Refuge were greatly reduced.

in the northern part of the State. Breeding habitat was confined entirely to permanent water areas; none of the seasonally flooded marshes of northern Utah contained water. Conditions in scattered parts of the southern half of the State were slightly improved over those of a year ago; however, many of the irrigation reservoirs, which produce most of the Canada geese in this part of the State, are low with some expected to dry completely before the end of the summer. These drouth conditions will unquestionably reduce waterfowl production in Utah.

BREEDING POPULATION INDEXES

Nesting pair data recorded during aerial and ground surveys are presented in table E-10 (p. 89). Duck nesting populations were reduced 17 percent from 1960 and 62 percent from 1959. Canada goose nesting populations are down 13 percent from 1960 and 8 percent from 1959.

PRODUCTION INDEXES

Duck production for the State shows a decrease of 18 percent from last year and is 70 percent below 1959. Canada goose production is equal to last year and is 11 percent below 1959.

Table F-15 (p. 113) shows production trends on comparable areas for the years 1959-61.

CONCLUSIONS

Severe drought conditions prevail throughout the State and this year's waterfowl production is the poorest on record. Very little suitable habitat will be available to migrating waterfowl this fall and winter.

UTAH

Data supplied by Donald A. Smith, Utah Department of Fish and Game

WEATHER AND WATER CONDITIONS

The winter and spring months of 1961 were the driest in several years especially

BREEDING POPULATION INDEXES

Aerial census figures for 1961 indicate a reduction of 14 percent in breeding pairs of ducks from 1960. (Table E-11, p. 90.) Areas showing the most drastic declines were the natural and manmade marshes from Salt Lake County north. Utah County showed a significant increase with 48 ducks per square mile counted this year. This is the highest concentration of breeding waterfowl censused in this County since aerial observations have been conducted. It is surmized that this concentration was effected by drouth conditions over the State. Whereas, the marshes of the northern counties are shallow and dried relatively early, the marshes of Utah County are associated with Utah Lake, a relatively stable and permanent body of water.

Two transects and one gun club area were entirely dry during the census period.

Ground counts, conducted on all management areas and several of the natural marshes over the State, revealed significantly lower numbers of breeding waterfowl in the northern marshes (table E-12, p. 90). Southern areas showed significant increases in breeding pairs of ducks since 1960 (table E-13). As previously stated, the southern part of the State is not as seriously affected by drouth conditions as are the northern sections.

No significant changes in species composition were noted in 1961 as compared with 1960.

PRODUCTION INDEXES

Trend counts of Canada goose broods were again conducted in 1961. Significant increases, both in the number of broods

and in the young produced, were noted on Farmington Bay and Bear River Refuges. Other goose-producing areas were more or less the same as in 1960. An overall increase of 116 broods and 629 young was noted from 1960 to 1961 (table F-16, p. 114).

The average number of goslings per brood in 1961 was 4.86 compared with 4.75 in 1960.

Considering the reduction in broods on Ogden Bay Refuge and the increases on both Bear River Refuge and Farmington Bay Refuge, it appears there may have been a shift of breeding geese from Ogden Bay to the other two refuges. To further substantiate this suspicion, two broods on Farmington Bay were accompanied by neck-collared adults. Ogden Bay geese were

collar marked only during the years 1956 through 1959. Such a shift could not account for all of the increase on these two areas, but it does provide a partial answer. Many of the gun club areas around Farmington Bay Refuge were dry during the census period and geese normally brooding on these areas may have moved onto the Refuge, which would also contribute to the nearly 60-percent increase there.

CONCLUSIONS

It is estimated that there will be a decrease in the fall flight of ducks as compared with last year's flight and an increase in the flight of Canada geese.

CENTRAL FLYWAY WATERFOWL KILL SURVEY

An estimated 1,403,219 ducks were bagged during the 1960-61 waterfowl season in the Central Flyway (table A-5, p. 46), suggesting a slight decrease (2 percent) from the previous year. An additional 376,724 ducks were estimated killed but not retrieved (an unusual 85-percent increase), resulting in a total kill of 1,779,943 ducks, 8 percent more than last season.

Mallards made up nearly 50 percent of the reported duck bag; green-winged teal, 13 percent; pintail, 10 percent; and blue-winged teal, 7 percent. These four species constituted 80 percent of the total duck bag.

The kill of pintail increased 13 percent from the previous season; the kill of blue-winged teal dropped 12 percent and that of scaup decreased 45 percent; whereas, the kill of shoveler and American widgeon increased 56 and 64 percent, respectively. The extreme changes reported in the bags of black duck and cinnamon teal are unrealistic and are undoubtedly a result of the previously explained mixup in the distribution of the eastern and western forms of the questionnaire (see p. 2). Large decreases occurred in the estimated bags

of redhead and canvasback, as expected with closed seasons, although the reported kills were still 5 and 13 percent of the previous year's bags of the two species.

An estimated 214,900 geese were retrieved during 1960-61, virtually the same number as in the 1959-60 season, and an additional 48,529 geese were killed but not retrieved (a 59-percent increase). Canada geese composed 61 percent and snow geese 22 percent of the total reported goose bag.

A total of 24,236 coots was estimated retrieved, representing a substantial increase (49 percent) from the 1959-60 season. The 21,856 coots killed but not retrieved resulted in a total kill of 46,092 coots for the season, a 66-percent increase from the previous year.

The number of potential hunters in the Central Flyway remained the same as during the 1959-60 season, but the number of active hunters dropped 4 percent (table A-6, p. 47). The average number of times hunted per active hunter increased 15 percent. Adult hunters bagged an average of 4.8 ducks during the season, an increase of only 1 percent from the previous year.

WING COLLECTION SURVEY

There was no mail collection of duck wings from hunters in the Central Flyway during either the 1959-60 or 1960-61 hunting season. Supplemental collections of mallard wings by Bureau and State personnel were not extensive enough in 1959-60

to permit reliable comparisons between seasons. The results of supplemental mallard wing collections in the Central Flyway are summarized in table B-2 (p. 55).

WINTER SURVEY

FACTORS AFFECTING SURVEY

Weather conditions during the survey were such that visibility was excellent and aerial coverage was completed throughout most sections of the Flyway in a minimum of time. Water areas in the northern part of the Flyway were generally ice-covered and waterfowl were largely confined to streams and rivers. Rain, fog, frost, and overcast skies delayed conduct of the survey in western Montana and along the upper and lower coastal areas of Texas. Fog and frost persisted until midafternoon of January 4 and 5 west of the Continental Divide in Montana. A 2-day heavy overcast, fog, and rain delayed the survey along the lower Texas coast. Weather conditions were adverse in the upper Texas coastal areas as rain, fog, and overcast skies seriously hampered aerial coverage. A partial coverage of this important waterfowl wintering area was made January 4, 9, 10, and 14. Ground observations were impeded by above-normal precipitation, which made travel off the main highway impossible and caused the wintering birds to scatter over thousands of acres of flooded rice fields and pasture lands. These conditions prevented continuous conduct of the survey and may have resulted in some groups of birds being tabulated several times or being omitted from the survey entirely.

POPULATION TRENDS

Based on data from comparable areas within the Flyway, there was little change in the total number of ducks. Among the important species, however, was a further decrease in the mallard population (-14

percent). The 1961 wintering population of this species is now 60 percent below the peak population recorded in the Flyway in 1958. A large increase in the number of redhead was recorded as compared with last year (231,600 to 614,400, or +165 percent). The problem of accuracy of winter survey redhead population indexes was discussed at length in the Waterfowl Status Reports for 1959 and 1960. For the past 4 years in the Central Flyway, redhead have numbered approximately 510,000; 876,000; 232,000; and 614,000. It is improbable that these figures represent a population change from one year to the next and it is difficult to determine a trend, except in a very general way. As mentioned in the waterfowl status report for 1960, the difficulty seems to be one of locating the redheads during the survey period. For redhead and other species whose habits are such that they often rest in large rafts on open water far from land, it is unlikely that the winter survey data are of much use as indicators of population status. However, for most species it is believed that the data are sufficiently accurate to reveal general trends in population levels.

The recorded goose population declined somewhat (-8 percent). The number of Canada geese remained about the same; snow and blue geese decreased 7 and 18 percent, respectively; and white-fronted geese decreased 51 percent, to a recorded population of only 14,779 birds. In view of the estimated kill of the white-front in the Central Flyway, both in Canada and in the United States, it seems definite that only a fraction of the total population present on the wintering grounds is located and recorded. However, the recorded wintering population of white-fronted geese in the

Flyway has been declining irregularly since the peak population of 60,000 recorded in 1953, and there is reason for concern.

The coot population increased considerably over its 1960 numbers (+47 percent) and reached a level approximately equal to the average of the past 13 years.

The winter survey data for 1961 are presented in Appendix C: species composition and comparisons with 1960 in table C-5 (p. 64), and comparisons with previous years in tables C-6 and C-7 (p. 65), and in figures C-1, C-2, and C-5 (p. 70, 71, and 74).

BREEDING GROUND SURVEY

SOUTHERN SASKATCHEWAN

Data supplied by Rossalius C. Hanson and Herbert O. Duncan,
Bureau of Sport Fisheries
and Wildlife

WEATHER AND WATER CONDITIONS

Water in the potholes, ponds, and marshes was the lowest ever recorded in the aerial surveys. Drought conditions may be nearly as bad as in the thirties, and any improvements noted in May 1960 have been eliminated. The survey indicated water losses in all strata. A loss of 72 percent is noted, when the water areas recorded this year are compared with those reported in 1960. The number of ponds recorded this year was 25 percent below that in 1959, which was a very poor water year.

This loss climaxed a dry summer and fall in 1960 with an open winter, and very unfavorable runoff conditions in the spring of 1961. What moisture did fall during the winter was absorbed by the soil.

A report from the Searle Grain Co., Ltd., based on moisture conditions as of May 1, 1961, states--

Outside the year 1958, when the index was approximately the same, there has been only 3 years during the past 25 years when fall precipitation over western Canada, as a whole, was lower than that reported for 1960. These were 1936, 1948, and 1955. Snowfall during the winter of 1960-1961 was relatively light, especially in southern areas where it disappeared early and was not a factor. There was, however, much less runoff this spring.

In late April, temperatures dropped to 10° F., and during early May freezing night temperatures were the rule. Ice was still holding just north of Prince Albert the last week in May. About May 20 the weather started to warm and the temperature rose above 80°. Apparently, nesting was con-

siderably delayed by the long cold spring, and it appeared to be at least 10 days later than normal.

Nesting habitat, as in 1959, was definitely lacking, with wide mudflats surrounding potholes, little or no over-water cover, and mowed or burned edges. Early burning was noticeably absent this year until about May 20, after which numerous fires were seen daily.

Water and habitat conditions showed no improvement between May and July. Water levels continued to decline and the drought increased in intensity. Crops deteriorated with the drying up of ponds. The July 1961 pond index was 89 percent below the 8-year average; it was 79 percent below the 1960 index and 55 percent below that of 1959. Water data are presented in tables D-2 and D-3 (p. 77).

BREEDING POPULATION INDEXES

The numbers of ducks in the Saskatchewan prairies were down drastically in May 1961. The total duck index was 2,038,000: a decline of 37 percent from the 1960 index, 36 percent from that of 1959, and 51 percent below the 11-year average. Compared with 1960, dabbling ducks were down 40 percent and divers 10 percent. Of the important species, only canvasbacks and scaup gained, and the gains were small; probably their status should be called unchanged. In practically all other species the decline was 30 percent or more. These comments are also true when comparing the 1961 records with those of 1959, one of the worst production years on record. A look at the long-term, 11-year average shows a decline in every major species, and here again the decline is 35 percent or more. The coot index is down 53 percent from the 1960 index--probably a fairly reliable index of coot usage of the Saskatchewan area.

As in 1959, sizeable numbers of paired ducks were seen in flocks on small water areas. In 1959 these displaced pairs apparently made little effort to nest. It appears that somewhat the same situation will occur here this year unless the birds move into better water areas. We have no accurate way of judging the numbers involved in this category but they appear smaller than in 1959, which may be at least one favorable factor. Indexes of grouped ducks compare as follows: 1961, 136,300; 1960, 74,200; 1959, 193,300. Detailed population data are presented in tables E-14 and E-15 (p. 91, 92).

PRODUCTION INDEXES

As is to be expected, the production of broods was down from previous years. At first, in July, it appeared production would be a failure; however, a few broods were produced in even the driest sections, and where a bit of water remained, a much reduced brood crop was found. The brood index in 1961 was 44 percent below that of 1960, 35 percent below the 1959 index, and 76 percent below the 8-year average. One or two areas held to the 1959 level. The index in stratum A-West was above the 1959 level, but it was still below that of 1960 and the long-term average. The eastern parts of the Province had greater production losses than could be made up by any slight gains in the west or northwest prairie areas of the Province. Visibility factors due to open mudflats tended to make broods more readily seen and had some influence on total numbers of broods observed. Therefore, it would be expected that in years of more cover, such as 1960, broods probably were missed in the count to a greater extent. This would tend to put an even more pessimistic outlook on broods seen this year than the figures indicate.

Ducklings in class II and III broods averaged 4.6 to the brood, compared with 4.7 in 1960, 4.1 in 1959, and 5.9 for the 8-year average. An analysis of the broods seen indicated 24 percent in class I, 34 percent in class II, and 42 percent in class III. Thus, a less-than-normal brood size with a majority of the broods in the older age brackets is indicated.

The few coot broods seen were in the more northern transects of the prairies,

where better water conditions were found. The coot brood index for 1961 is down from 1960 but a little above 1959. So few broods were seen that any real evaluation of the trend is questionable.

The late-nesting index was for all practicable purposes nonexistent this year. It was 77 percent below that of 1960, 60 percent below that of 1959, and 73 percent below the long-term average. The few birds making a late-nesting effort will be hard pressed to bring any broods to maturity because of the dwindling water supply.

When the production survey data are viewed collectively the outlook for 1961 is the worst on aerial survey records and is well below the drought year of 1959. Production data details are presented in tables F-17 and F-18 (p. 114, 115).

CONCLUSIONS

The drought intensified in the prairie areas of southern Saskatchewan during the spring and summer of 1961. Water and habitat conditions were the poorest in the records of aerial surveys. Brood production was down 44 percent and the July pond index was down 79 percent from 1960. For all practical purposes the late-nesting index was nonexistent.

The 1961 forecast index is the lowest on record, indicating an unsatisfactory outlook as far as duck production from this area is concerned. The outlook for the fall flight from southern Saskatchewan is the poorest on record.

MONTANA

Data supplied by Dale Witt,
Montana State Fish and
Game Commission

WEATHER AND WATER CONDITIONS

Water conditions during the May survey in the glaciated subdivisions have deteriorated since the previous year. This was mainly due to a dry hot summer and an extreme warm and dry winter. The major decrease in water areas was in the pothole-type habitat. (See table D-4, p. 78.) Water conditions in the Flathead Valley were affected by drought conditions last summer

and winter but were improved by early spring snows and rains to the point of being the best in several years.

Late water conditions in the glaciated subdivisions and the prairies in eastern Montana have deteriorated from the time of the May survey. In the Flathead Valley, west of the Continental Divide, good water conditions have held through the summer.

BREEDING POPULATION INDEXES

The May 1961 survey indicated a decrease in total ducks from last year in the glaciated subdivisions and a decrease in most areas from the 12-year average (table E-16, p. 92).

The number of breeding waterfowl in the Flathead Valley area is about equal to 1960 and is one of the highest recorded (table E-17).

Considering the total Montana waterfowl breeding populations and water conditions in the most of the State, there is an apparent decrease from last year and from the long-term average. The one major exception to this is the Flathead Valley trend area, or that part of the State lying west of the Continental Divide.

There is evidence of some decrease in the breeding population of Canada geese this year, when all breeding areas are viewed collectively (table E-18).

PRODUCTION INDEXES

The only area in the State where duck production data are gathered is in the Flathead Valley. At the time of this report, brood production appears to be running about 2 weeks late, possibly because of the extremely wet spring.

From reports on production and late water conditions in the eastern part of the State, production and brooding conditions appear poor.

Canada goose production decreased markedly in the Hi-Line unit and remained about the same in the Helena and Great Falls-Piedmont units. Production survey data for these units are presented in table F-19 (p. 116). In the Flathead Valley unit both breeding population and production increased this year. Production in 1961 is 577 as compared with 493 last year.

CONCLUSIONS

Breeding populations of ducks are down 19 percent in the eastern part of the State and production prospects are poor due to drought conditions. Although habitat conditions are good west of the Continental Divide the populations involved are relatively small. Therefore, for the State as a whole a decrease in the fall flight of ducks is expected as compared with last year.

The decrease in both breeding population and production of Canada geese in the Hi-Line unit is such that the fall flight of this species from the State is expected to decrease as compared with 1960.

NORTH DAKOTA, SOUTH DAKOTA, AND WESTERN MINNESOTA

Data supplied by Glen
Orton and David Fisher,
Bureau of Sport Fisheries
and Wildlife

WEATHER AND WATER CONDITIONS

Above normal temperatures prevailed throughout the Dakotas and western Minnesota during the late winter. Snowfall was light. The low water levels from the fall of 1960 were not supplemented to any extent from spring runoff.

Rains during April were light and the entire area was lacking in top and subsoil moisture. Range land in the western strata was in poor condition because of lack of winter snow, but was given some relief by rains during mid-May.

Vegetative growth, which made recovery during the spring and summer of 1960, was completely destroyed on many potential waterfowl production areas because of the receding water. Burning was in evidence in the tri-State area and this practice was accelerated as spring advanced.

Receding water levels exposed mud flats which stranded emergent and shoreline vegetation. Many potential pothole basins were under cultivation.

Compared with 1960, the May water indexes in 1961 declined 32 percent, 73 percent, and 33 percent for the east, central, and west strata of the tri-State area with an overall drop of 56 percent. The number of water areas is 9.7 percent below the dry year of 1959.

In early summer the tri-State area was characterized by hot weather and a general lack of precipitation. The lack of rainfall resulted in deterioration of pasture lands and greatly curtailed production of small grains. Hay cutting was prevalent in the dried-out pothole basins as well as in adjacent Soil Bank lands. This widespread destruction of nesting habitat could be an important factor in next year's production.

Drought conditions were less severe in the east strata of the Red River Valley, but even here, rainfall was not sufficient to maintain good habitat conditions.

Overall waterfowl conditions in South Dakota were better than in North Dakota.

The July pond index was 52 percent below the 1960 index, and was less than for the dry year of 1959.

Detailed water data are presented in table D-5 (p. 78).

BREEDING POPULATION INDEXES

Late vegetative growth, scarcity of water, and low water levels with mudflat conditions on some pothole-type water areas probably accounted for a larger part of the population being observed this year in comparison with 1960.

Duck breeding population indexes show a 10-percent decrease from 1960, a 41-percent increase over 1959, but a 26-percent decrease from 1958. Though the drop in total population index is not as drastic as that of the water index, it is felt that the visibility factors mentioned accounted for a larger part of the population present being observed than in 1960.

Although 67 percent of drake mallard, pintail, and canvasback were without hens, indicating that nesting was underway, many grouped birds of all species that did not appear to be nesting were noted throughout the survey period.

Diving ducks were down 44 percent from 1960 and dabbling ducks were down 6 percent. Mallard and blue-winged teal showed 24 percent and 6 percent increases over 1960. All other dabbling ducks were down from 6 percent to 34 percent. Canvasback, redhead, scaup, and ruddy duck showed declines of 11 percent, 62 percent, 39 percent, and 60 percent, respectively.

Waterfowl breeding populations, by strata, and for the period 1958-61 are given in tables E-19 and E-20 (p. 94).

PRODUCTION INDEXES

Total duck broods showed a 24-percent drop from 1960, though a substantial increase over 1959. Due to exposed mudflats this year it is felt that a larger proportion of broods present were observed. Coot broods showed a decrease of 37 percent from 1960, though numbers were small.

The late-nesting index showed a 53 percent increase, but the large numbers of loafing birds on the water areas made accurate determinations difficult. Waterfowl production data by strata and for the years 1958-61 are given in tables F-20 and F-21 (p. 116, 117).

CONCLUSIONS

The duck brood index was 24 percent below 1960 and coots showed a 37 percent decrease from that year. Though late-nesting indexes showed a potential late brood of 53 percent above that of 1960, we do not believe this hatch, even if it should materialize, could reach maturity because of the lack of available water. Therefore, it is concluded that there will be considerable reduction in the fall flight of ducks from this area as compared with last year.

NORTH DAKOTA

Data supplied by Charles H. Schroeder, North Dakota Game and Fish Department

WEATHER AND WATER CONDITIONS

Water conditions in North Dakota during the spring of 1961 were much worse than they were in 1960—the result of below average precipitation being received since the summer of 1960. The 1961 water index was 56 percent below the 1960 index and 55 percent below the 1948-60 average index. Water conditions during the spring of 1961 were fast approaching the very poor conditions experienced in 1959, and by mid-July they were the poorest recorded since this survey was started. The 1961 water index of 0.45 per square mile was 91 percent below the 1960 index of 5.02, 72 percent below the 1959 index of 1.63, and 88 percent below the 1958-60 average water index of 3.89.

Comparison of the May 1961 water index with that of 1960 and with the average for the period 1948-60 is presented in table D-6 (p. 78).

BREEDING POPULATION INDEXES

The 1961 breeding waterfowl index was 10 percent above the 1960 index and 5 percent below the 1948-60 average index. The slight increase recorded in the 1961 breeding waterfowl index may be misleading, since the ground survey may have been conducted a week early (some flocks of blue-winged teal and gadwall were noted during the survey).

The species indexes for 1961 indicated that blue-winged teal, gadwall, widgeon, and green-winged teal experienced a large increase over the 1960 indexes, while pintail and ruddy duck showed large decreases (table E-21, p. 95).

An indication of the progress of nesting activities can be obtained by examining the ratio of lone drakes in paired drakes. The lone drake to paired drake ratios obtained in 1961 (low) would suggest that the nesting season was later than that of recent years and/or that the early nesting attempts of pintail and mallard were not very successful. The lone drake to paired drake ratios for several species for 1956 through 1961 are presented in table E-22.

PRODUCTION INDEXES

The 1961 mid-July brood index (broods per square mile) of 2.26 represented the highest index obtained since the survey was started. However, the conditions under which the 1961 brood index was obtained were so different from those of recent years that the data are not directly comparable. Most of the water areas remaining by mid-July were of the large, open-type areas with wide, bare, mud flats surrounding the water. Also, the duck broods were concentrated on the relatively few water areas remaining by mid-July. The resulting concentration of broods and the bare mud flats affected the behavior of certain species in a manner that made them more easily observed than they normally are.

For these reasons, it is believed that a greater percentage of the broods were observed in 1961 than at any time since this survey was started. The 1961 brood

index was more a measure of the percentage of broods present that were observed than it was of the change of duck production. The brood index on 92.1 square miles covered by ground surveys was 2.26 broods per square mile. Species and age-class composition of the broods observed are presented in tables F-22 and F-23 (p. 117).

Lacking comparable brood data, it is judged that duck production in North Dakota in 1961 will be similar to, or less, than that experienced in 1959.

CONCLUSIONS

The fall flight of ducks from North Dakota in 1961 is expected to be considerably below that of 1960 and no better than that experienced in 1959.

SOUTH DAKOTA

Data supplied by Maurice E. Anderson, South Dakota Department of Game, Fish and Parks

WEATHER AND HABITAT CONDITIONS

Waterfowl habitat and water conditions in South Dakota have not continued the favorable trends exhibited in 1960. Statewide, habitat conditions decreased in quantity and quality. The southeastern part of the State had ample moisture to maintain good habitat for breeding ducks; northeastern South Dakota showed some reduction in quality of breeding habitat as well as quantity of breeding ducks. The range country west of the Missouri River generally had little spring runoff in 1961. Although the number of water areas did not drastically change, the quality of those remaining was considerably reduced.

In early June, subsequent to establishment of breeding residence by most duck species, the entire State received heavy rains and habitat conditions for resident breeding ducks were improved. The remainder of June and the month of July were characterized by scattered rains that had only moderate value for maintaining Statewide water conditions.

The May 1961 pond index of 1.74 per square mile is 53 percent less than in 1960 and 59 percent less than the 11-year

(1950-60) average. It is the lowest index recorded since surveys were started in 1950. The previous low was 2.24 in 1959.

The Statewide, mid-July pond density index decreased from 4.16 in 1960 to 2.29 ponds per square mile in 1961, or a 45-percent decrease. The 1961 mid-July pond index is 27 percent below the 1953-60 index of 3.11 ponds per square mile for the 8-year average. Data concerning number of water areas are presented in table D-7 (p. 79).

BREEDING POPULATION INDEXES

The 1961 population index of 310,573 was 2 percent below that of 1960 and 44 percent below the 11-year (1950-60) average of 550,100 ducks. The duck density index in 1961 was 4.22 ducks per square mile compared with 4.30 in 1960. Breeding population data are presented in table E-23 (p. 96).

PRODUCTION INDEXES

The Statewide, mid-July brood density index decreased slightly from .49 broods per square mile in 1960 to .45 in 1961 (-8 percent). The 1961 index was 2 percent below the 11-year (1953-60) average of .46 broods per square mile. Production survey data are presented in table F-24 (p. 118).

CONCLUSIONS

Based primarily on a deterioration of habitat conditions, it is estimated that the fall flight of ducks from South Dakota will be smaller than in 1960.

NEBRASKA

Data supplied by George Schildman, Nebraska Game, Forestation and Parks Commission

WEATHER AND HABITAT CONDITIONS

Water conditions in the Nebraska Sandhills were generally good at the time breeding ground flights were made during May 19 through May 22, 1961.

The eastern and central areas had less water than at the same time in 1960, but conditions were very good. The western area was in good shape at the time of inspection; however, much of the water at that time was in the form of temporary-runoff ponds. The northern extremities of all of the areas were in fair to poor condition in mid-May.

A period of very light, scattered rainfall accompanied by a week of near 100° and above temperatures in late June and the first 15 days of July dried many potholes and sloughs in the eastern and central Sandhills. The small water areas of the western area suffered somewhat but did not deteriorate so badly because of occasional rainfall.

Water conditions were excellent in the rainwater-basin area of south-central Nebraska, at the time of the breeding ground flights, but less than the near-record amounts of 1960. However, water levels were quite low during the spring migration, and the ducks had moved on before the rains occurred. As a result, there was considerable unoccupied habitat.

At the time of the aerial brood-count flights, which were made July 7 through July 10, 1961, water conditions throughout the Sandhills were fair to good. Most small potholes and sloughs had dried. Larger water bodies were in good to excellent condition. Most larger lakes had as much or more water than at the same time in 1960. Northern areas were still dry.

BREEDING POPULATION INDEXES

The data indicate a breeding population index in the Sandhills of 141,800 ducks; about the same as a year ago, but 12 percent above the average of the previous 6 years. The south-central part was very dry during the spring migration, but had excellent water conditions by late May. However, much of this habitat was unoccupied and the calculated population of 16,300 was 57 percent below the 1960 population.

Comparison of aerial and ground determination of the species composition are shown in table E-24 (p. 96). Blue-winged teal showed the greatest loss in numbers--about 13,000 in the Sandhills and 15,000 in the south-central part of the State. Pintails and green-winged teal showed appreciable decreases, while mallards, redheads, and scaup showed significant increases.

PRODUCTION INDEXES

Aerial brood transects were flown over the Sandhills for the first time in 1961 and, therefore, no comparison can be made with previous years. The data collected are presented in appendix table F-25 (p. 118).

Unusual numbers of loafing adult ducks were found on numerous lakes. A logical explanation appears to be that a large number of these apparent "loafers" had been to northern breeding areas and returned because of the extremely dry conditions. The earlier birds, on their return may have nested in the Sandhills, thus accounting for the irregular and late brood appearances.

A greater number of late broods were noted this year than usual. Weather and water conditions in the Sandhills indicated that a comparatively even hatch should have

occurred. Quite a number of newly hatched duck broods were seen as late as the third week in July. Ranchers reported finding newly hatched ducklings and nests of eggs still being incubated during haying operations, which were in full swing on July 10. Between July 17 and July 20 in the south-central area, observations include 3 newly hatched broods of blue-winged teal, 1 each of shoveler, mallard, pintail, and an incubating blue-winged teal with 10 eggs.

CONCLUSIONS

Nebraska's overall contribution of ducks to the fall flight will probably be slightly less than a year ago, but considerably above the previous 6-year average.

MISSISSIPPI FLYWAY WATERFOWL KILL SURVEY

In the Mississippi Flyway an estimated 2,977,411 ducks were bagged during the 1960-61 waterfowl season (table A-7, p. 48), an increase of 7 percent from the 1959-60 season. An additional 778,213 ducks were estimated to have been killed but not retrieved, resulting in a total kill of 3,755,624 ducks, 9 percent more than during the previous season.

In the Mississippi Flyway the species composition of the duck bag was derived independently from the wing collection survey and from the waterfowl kill survey (table A-2, p. 43). In both surveys, mallards were estimated to have composed about 50 percent of the bag, and data from the two surveys were in reasonable agreement for most of the other major species. Both surveys reported some kill of the protected redhead and canvasback.

The estimated bag of 177,990 geese was 28 percent lower than that for the 1959-60 season (table A-7). Also killed but not retrieved were 34,532 geese, a 44-percent

decrease. The bag of 114,773 Canada geese, which was 64 percent of the total goose bag, represents a drop of 18 percent for this species from the previous season.

Decreases in the bags of other species of geese in the Mississippi Flyway were for blue geese, 41 percent; snow geese, 45 percent; and white-fronted geese, 63 percent.

A total of 195,112 coots was retrieved, a decided increase (136 percent) over the previous year; and the 60,907 coots killed but not retrieved (a 27-percent increase) resulted in a total kill of 256,019 coots. This estimated kill is 96-percent higher than the estimate for the 1959-60 hunting season.

The number of potential hunters remained constant in the Mississippi Flyway, although active hunters decreased 5 percent (table A-8). Adult hunters bagged an average of 5.0 ducks during the season, an increase of 20 percent from the previous year.

WING COLLECTION SURVEY

Flyway-wide age ratios of the more important species of ducks in the kill during the 1959-60 and 1960-61 hunting seasons in the Mississippi Flyway are given in table B-3 (p. 56). Nearly all species showed an increase in the ratio

of immature to adult birds during the 1960-61 hunting season. The black duck was the only species to show a decrease in the proportion of young birds to adults in the hunter's bag.

Mallard age ratios in the kill in each

State in the Flyway for both the 1959-60 and 1960-61 season are presented in table B-4. An increase in the proportion of young mallards in 1960-61 was noted in the kill in all States except Indiana, where the 1959-60 season's sample was inadequate for comparison. In many States the ratio of immature to adult birds in 1960-61 was more than twice that obtained during the 1959-60 season. The ratio of young to adult mallards increased from west to east among the States of Minnesota, Wisconsin, and Michigan in both years.

Species composition of the kill during the 1960-61 hunting season as derived from the wing-collection survey indicated an increase in the importance of mallards but a marked decrease in lesser scaup when compared with species composition ob-

tained from wings collected in the 1959-60 hunting season (table B-2). The wing collection survey and the waterfowl kill survey were in good agreement as to the species composition of the kill and thus results of the wing-collection survey supported the findings of the waterfowl kill survey (table A-2, p. 43). Gadwall, American widgeon, and ring-necked duck wings were received in relatively greater number than hunters reported these species on their questionnaire forms. Wings of mallards, blue-winged and green-winged teal, and scaup were received in relatively fewer numbers than hunters reported. Because not all hunters received the eastern questionnaire form on which the black duck was listed, the waterfowl kill survey probably under-reported that species.

WINTER SURVEY

FACTORS AFFECTING SURVEY

Seldom, if ever, in the past have conditions for observing waterfowl been as uniformly good in the Mississippi Flyway as they were this year during the inventory period. No adverse factors affecting waterfowl counts were reported. Besides the good weather other factors that tended to make counting easier included semi-drought conditions or ice cover, which restricted the birds to fewer places, and the recent ending of the waterfowl hunting season in seven States, so that the birds were still concentrated on or near refuges at the time of the survey.

So many favorable conditions occurring simultaneously is unusual and the counts may be biased in favor of 1961 when comparisons with past years are made.

POPULATION TRENDS

More than $9\frac{1}{4}$ million ducks, geese, swans, and coots were tallied in the Mississippi Flyway States during the 1961 survey. This count is 40 percent above the 11-year average and 18 percent higher than last year's count. It should not be assumed, however, that the current situation in this Flyway is a reflection of the overall status of the waterfowl population. In fact, a detailed analysis suggests that the situation

is somewhat less favorable than the gross figures indicate.

This year's high total was greatly influenced by (1) the scaup count, (2) the count in southwestern Louisiana of certain dabblers, (3) the coot count, and (4) the goose count. The greatest single influence was the scaup count, which reached an unprecedented 1,625,578, or 8 times the average for the 10-year period preceding 1960. It has been recognized for a long time that a high or low scaup count in any given year merely reflects whether the birds were inshore or offshore. Some years the bulk of the population is outside the range of the census takers and results in a low count. Last year and again this year conditions were such that the birds were found along the census routes. Unless this erratic behavior of the scaup is understood and taken into account, the data from this survey can be quite misleading.

The continued favorable habitat conditions in the coastal marshes of western Louisiana, resulting from Hurricane Audrey, were reflected in the high counts of six dabblers: gadwall, baldpate, green-winged teal, blue-winged teal, shoveler, and pintail. The latest count in that area for these species was more than twice the average for the 8-year period before the hurricane and, excluding the pintail, the difference was even greater. Were the conditions in these marshes to become less favorable, a high

proportion of these populations would probably continue through the Flyway and beyond, as they did before the hurricane.

Not so readily explained is the high coot count this year, which exceeded all counts of the past 13 years and for the first time topped the half-million mark. How much of the increase can be attributed to favorable habitat conditions in the Flyway and how much to improved population status is not known. It is known that coot populations shift around the wintering grounds with unpredictable irregularity.

The goose count of more than 900,000 birds in the Mississippi Flyway also set a new high, due to peak counts in at least the past 12 years for Canada, blue, and white-fronted geese.

Important species that failed to reach desirable population levels were the mallard, redhead, and canvasback. All three

gained slightly over their poor status in 1960 but are still below their long-term averages. Any optimism generated by the generally high counts obtained during this survey for most species must be tempered by the knowledge that the mallard is by far the most important species to this Flyway's waterfowl hunters and that its present population level is considerably below that of the late fifties. Since most canvasback and redhead winter outside this Flyway, the changes recorded here are not necessarily indicative of the general population status of these species.

The winter survey data are presented in appendix C: species composition and comparison with 1960 are presented in table C-8, (p. 66), comparisons with previous years in tables C-9 and C-10 (p. 67), and in figures C-1, C-2, and C-5 (p. 70, 71, and 74).

BREEDING GROUND SURVEY

NORTHERN SASKATCHEWAN, NORTHERN MANITOBA, AND WESTERN ONTARIO

Data supplied by E. B. Chamberlain and Joseph W. Perroux, Jr.,
Bureau of Sport Fisheries
and Wildlife

WEATHER AND WATER CONDITIONS

Breakup was later than usual this year over most of the North. Although we started a week earlier than usual from the States, weather and airplane difficulties combined to hold us back until we finally started the survey on the same date as last year, and we saw ice in lakes that were clear on the same date in 1960.

Water conditions were bad throughout the survey area. Lack of precipitation caused many of the larger lakes to drop 4 to 6 feet below their normal levels. These conditions persisted through July. The Saskatchewan River Delta, however, showed a considerable increase in water at the time of the July survey. Although the area generally suffered from lack of rainfall some rather extensive rains eased the situation over a considerable portion of the survey area. While coming too late to be

of much help to ducks or agriculture these rains eased the fire hazard and helped to bring some fires under control.

BREEDING POPULATION INDEXES

Results of the May survey appear in tables E-25 and E-26 (p. 97, 98). Overall, the picture is somewhat on the dim side, with the total population index at its lowest since 1958.

PRODUCTION INDEXES

Results of the July survey appear in tables F-26 and F-27, (p. 118, 119). It will be seen that the total young index jumped from 213,115 in 1960 to 303,882 this year, an increase of 42 percent. This is the highest number recorded for this area since July surveys were initiated. This index, together with the lower late-nesting index, indicates that early nesting attempts were successful. It is evident from the survey date that production from this area will be substantially above normal.

CONCLUSIONS

It is believed that the substantial increase in production will offset the small decrease

in breeding population and the fall flight from this area will be somewhat larger than last year.

SOUTHERN MANITOBA

Data supplied by Charles D. Evans
and Howard Brown,
Bureau of Sport Fisheries
and Wildlife

WEATHER AND HABITAT CONDITIONS

Spring 1961 in southern Manitoba was characterized by an extremely late breakup and widespread drought. A heavy snow in April provided good water conditions in the south-central portion of the Province, from the Red River west to Whitewater Lake, Oak Lake, and the Riding Mountains. Elsewhere in the survey area the drought was severe, causing the number of water areas to be the lowest since 1952.

In areas where water conditions were good, nesting cover for diving ducks was much improved over the years since 1954, due to the good growth of emergents in 1960. Because of the low water levels in most of the survey area, this improvement in cover was only of local benefit.

By July, water levels were far below any previously seen. Manitoba, which had escaped the worst of the 2 previous years of drought, experienced one of the driest seasons on record. Vast expanses of habitat that normally are highly productive of waterfowl were reduced to a few scattered drying water areas. Water areas recorded in July were reduced 66 percent from their 1960 numbers and were 78 percent below the average of previous years. Those areas that remained were in most cases at low levels and the emergent vegetation, which made such good growth in 1960, was generally stranded on dry shores. While these conditions reduced the habitat available for nesting and brood rearing, they probably made the broods that were present more visible from the air than is normally the situation, contrasting with 1960, when emergent vegetation made brood observation difficult. So it is probable that the broods recorded this season represent a higher-than-average percentage of the population present.

The estimated number of water areas, by strata and years, for the May and July periods is presented in table D-8 (p. 79).

BREEDING POPULATION INDEXES

Between 1960 and 1961, a 27-percent decrease occurred in the number of adult birds recorded during the May survey in southern Manitoba. Flocked birds, prevalent in Manitoba since 1958, made up approximately 17 percent of the total. The most severely affected species of consequence were pintail, mallard, shoveler, and redhead. Blue-winged teal, scaup, and canvasback had moderate reductions, while ruddy and baldpate had moderate increases. Other species occurred in numbers too small for changes to be significant. Population indexes, by species and by stratum, for 1960 and 1961 are presented in table E-27 (p. 99). Table E-28 gives the breeding population indexes, by species, for each year since 1953.

PRODUCTION INDEXES

Table F-28 (p. 119) shows the brood index of ducks and coots and the late-nesting indexes, by species and by strata, for 1960 and 1961. The only species occurring in any numbers for which the late-nesting index was not reduced were scaup and redhead. The overall reduction from 1960 was 50 percent.

Table F-28 also shows the average size of the class-II and class-III duck broods, on which good counts were made in 1960 and 1961. The 5.5 young per brood recorded during 1961 is slightly below the 8-year average.

While the species of broods are not listed, both air and ground observations showed a scarcity of canvasback and redhead broods. Even in the choice nesting area in the vicinity of Brandon-Minnedosa-Newdale where water conditions were nearly normal, very few broods of these species were located.

It should be noted that along with the birds recorded as late nesters were many unrecorded, grouped birds that gave no evidence of nesting activity, and it is probable that many were recorded as late nesters that were temporarily separated from these groups. It is possible that the

nesting potential of the late nesting index is overrated this year.

Appendix table F-29 shows the brood index for ducks and coots and the late-nesting index for ducks for the 8-year period, 1954-61.

Duck broods recorded in stratum A were the second lowest on record for the period, while the index for stratum B was at its highest point. The overall late-nesting index, on the other hand, was at an all-time low. Only in stratum B had it once been lower.

Coot broods were greatly reduced from 1960 and were considerably below average.

Table F-30 shows the percentage of duck broods in classes I, II, and III. While the 30.9 percent of class I broods recorded this year is not the lowest on record, it is well below average. Very few newly hatched class-I broods were seen during the survey--further evidence of the improbability of the hatch continuing.

CONCLUSIONS

The fall flight from southern Manitoba is expected to be the lowest of the past 8-year period. Despite the fact that a fair number of broods were seen, the forecast index is reduced by the low late-nesting and water indexes and by the small percentage of broods in class I, all indicating that there would not be a strong later hatch. A very poor duck crop can be expected in southern Manitoba in 1961.

MINNESOTA

Data supplied by Forest Lee and
Robert Benson,
Minnesota Department of
Conservation

WEATHER AND HABITAT CONDITIONS

Based on 558 miles of auto transect in both the wooded and prairie parts of the State there were 6.0 water areas per square mile recorded in May this year as compared with 5.6 per square mile last year. This increase is misleading, however, since many of the areas were shallow and by July were dry.

BREEDING POPULATION INDEXES

Breeding pairs of ducks recorded during May surveys averaged 4.56 per square mile as compared with 4.44 in 1960. Among the species, blue-winged teal and ring-necked duck remained about the same but a decrease was recorded for mallards.

PRODUCTION INDEXES

In the western part of the State, drought reduced the number of broods. Also, a considerable number of adult birds in groups of mixed sexes was observed early in July, which is indicative of lack of nesting success.

In the eastern part of the State, there was some evidence of a larger number of broods than last year. However, drought caused many of the water areas to dry up, and the favorable brood picture for the more-permanent census areas may be biased by movement of broods to these areas from the dried-up potholes.

CONCLUSIONS

It is concluded that the fall flight of ducks will decrease from the western prairie section of the State as compared with 1960, but the number of birds coming from the eastern wooded part will be about the same as last year.

MICHIGAN

Data supplied by Merrill L. Petoskey,
Michigan Department of
Conservation

WEATHER AND WATER CONDITIONS

The winter was relatively mild by most standards, with less than the normal amount of snow and temperatures ranging above normal.

Temperatures during the spring migration were also above normal. Precipitation was generally deficient throughout most of the State during most of the first 6 months of the year. In the latter part of June, however, severe thunderstorm activity in the eastern part of the Upper Peninsula

resulted in 4 inches of rain in 2 days being reported at the Seney Refuge. Lake levels have declined throughout the State, and they average from 3 to 6 inches below the 15-year median.

The weather during April, May, and June has been conducive to a good breeding season with above-normal temperatures for the most part and less-than-normal precipitation.

BREEDING POPULATION INDEXES

The percentage species composition of the duck breeding population for 1960 and 1961 is given in table E-29 (p. 100). The potential breeding population compared with those of previous years is presented in table E-30.

Potential breeding wood ducks were counted during regular census trips. It should be understood that the observations made on the wood ducks are obtained in conjunction with observations on other species. No special study areas are set up for wood ducks and the areas censused do not contain very much of what is considered to be ideal wood duck habitat.

The number of potential breeding ducks seen per lineal mile of census route was the highest of the past 10 years, and the potential wood duck breeding population was the second highest, surpassed only in 1953. Wood ducks made up 4.8 percent of the local nesting species. This figure compares favorably with the average of past years.

PRODUCTION INDEXES

The number of broods observed per lineal mile in 1961 was one of the highest of the past 10 years, second only to that of 1952. Brood size was about average. The number of lone drakes observed was considerably lower than in the past 2 years, leading us to believe that a good percentage of the nesting birds were successful. The results of the production survey are presented in table F-31 (p. 121).

CONCLUSIONS

A record number of potential breeders were on hand and with the favorable weather conditions, apparently a high percentage

of them nested. Subsequent data from brood counts lead us to believe that 1961 has been a good waterfowl production year in Michigan, ranking well above the average of the past 10 years.

IOWA

Data supplied by James G. Sieh,
Iowa State
Conservation Commission

WEATHER AND WATER CONDITIONS

Most of Iowa's prairie marshes and shallow lakes were dry or almost dry during 1957, 1958, and 1959. This drought period caused rapid re-vegetation of these areas with emergent aquatic plant species. Heavy runoff and above normal rainfall during the spring of 1960 inundated many sloughs, ponds, and potholes that had been dry. Runoff during the spring of 1961 increased the water levels in many areas and inundated additional dry habitats. These circumstances have caused optimum nesting and survival conditions for waterfowl in Iowa during 1961. Habitat and phenological conditions suitable for waterfowl production and survival appear the very best observed during 12 years of continuous study in northwestern Iowa, and conditions are likewise excellent throughout the State.

PRODUCTION INDEXES

Iowa is producing unusually large numbers of blue-winged teal, wood duck, ruddy duck, and redhead. The nesting effort and success of each of these four species appears of such magnitude that total production should be of significance to the Flyway in 1961. Both mallards and pintails are abundant for Iowa, but their total numbers are too few to be of importance on a Flyway basis. Other species of waterfowl are present, but their aggregate numbers are also not significant.

Coot production is far above normal. The nesting densities of this species in recently flooded habitats is tremendous and production is greater than had been expected.

Broods are beginning to appear, and nesting success based upon a few early observations looks encouraging. Vegetation

is so dense in many of the sloughs and marshes that it is impossible to make satisfactory brood counts and many broods are obviously present but cannot be seen or counted.

CONCLUSIONS

It is expected that the fall flight of ducks from Iowa will be considerably larger than that of last year.

INDIANA

Data supplied by Edward L.
Richardson, Indiana
Department of Conservation

WEATHER AND WATER CONDITIONS

Normal or low water levels prevailed on all stream sections except the Eel River. This stream, which is controlled by the U. S. Corps of Engineers flood-control structure at Cagles Mill, was carrying the maximum amount of runoff water when censused on May 26. Because of high water the count was considered poor. Heavy timber cutting noted on transect streams in 1960 did not appear to have an immediate adverse effect on wood duck production in 1961.

BREEDING POPULATION INDEXES

Three stream transects (Muscatatuck, Mississinewa, and Maumee) totaling 47 stream miles were traveled by powered boat between April 19 and May 3, 1961. All three streams were censused during a period of flooded conditions; however, only the Muscatatuck was out of its banks at the time, making the count of adults on this stream section questionable. A total of 99 male and 51 female wood ducks were seen. Males sighted were 24 percent above the 1960 average and 50 percent above the 1952-60 average. Females showed a slight decrease, with a 9-percent drop from 1960 but a 50-percent increase over the 1952-60 average. Adult wood duck populations, from preliminary stream section survey data, are presented in table E-31 (p. 100).

PRODUCTION INDEXES

The nine streams (Maumee, Elkhart, Eel, Big Blue, Salt, West Fork of the White, Mississinewa, Iroquois, and Muscatatuck) totaling 143 stream miles have been covered yearly since 1950. A total of 77 wood duck broods per 100 miles of stream were observed this year (table F-32, p.121). This brood count is 8 percent above the count for 1960 and is 23 percent above the previous 10-year average.

Whole counts were recorded on 96 of the 110 broods. Brood size averaged 8.9, which is slightly lower than in 1960, and ranged in size from 4 to 15. Timing for the brood-count survey was considered good.

CONCLUSIONS

The fall flight of wood ducks from Indiana will be somewhat greater than that of last year and considerably larger than the average of the past 8 years.

OHIO

Data supplied by Division of Wildlife,
Ohio Department of Natural
Resources

PRODUCTION INDEXES

Data concerning trends in production were obtained by means of stream surveys, checks of wood duck nest boxes, and brood surveys on two wildlife areas. The results of these surveys are presented in tables F-33, F-34, and F-35 (p. 131, 132).

On the basis of the data collected there was some increase in the number of wood duck broods observed per mile of stream, although the validity of these data as indicators of production trend is questioned. Wood duck nest-box utilization remained about the same: 32 percent were used in 1960 and 28 percent in 1961. Brood counts on two wildlife areas were somewhat below the numbers counted in 1958 and 1959.

CONCLUSIONS

It is expected that the fall flight of ducks from Ohio will be about the same as last year.

MISSOURI

Data supplied by R. W. Vaught,
Missouri Conservation Commission

BREEDING POPULATION AND PRODUCTION INDEXES

The results of the breeding population and production surveys conducted in

Missouri are presented in table F-36 (p. 122).

CONCLUSIONS

There will be an increase in the fall flight of ducks from Missouri over that of 1960.

ATLANTIC FLYWAY WATERFOWL KILL SURVEY

An estimated 809,159 ducks were retrieved in the Atlantic Flyway during the 1960-61 waterfowl season (table A-9, p. 50), with an additional 181,606 killed but not retrieved. These totals represent respective increases of 19 percent and 13 percent from the previous season. The total kill of 990,765 ducks approximates an 18-percent increase.

The species composition of the Atlantic Flyway duck bag was computed independently in the wing collection survey and in the waterfowl kill survey (table A-2, p. 43). Both surveys showed the black duck to be the most frequent species bagged, followed in turn by the mallard and the wood duck.

As explained in the introduction (p. 2), the western form of the questionnaire sent to some waterfowl hunters in the Atlantic Flyway did not list the black duck as a separate species. Undoubtedly this error caused the black duck to be insufficiently reported in some States and possibly the mallard to be reported too frequently. Both surveys reported a small proportion of redheads, but only the water-

fowl kill survey indicated a bag of canvasbacks.

The survey estimated that 96,508 geese were retrieved during the 1960-61 season, an increase of 61 percent from the previous year (table A-9, p. 50). An additional 10,631 were killed but not retrieved, a decrease of 15 percent.

The bag of Canada geese increased 75 percent (68,395 estimated bagged); this species composed more than 70 percent of all geese retrieved. The total bag of brant increased 32 percent.

Coots retrieved numbered 26,533, an increase of 152 percent from the previous year. Coots killed but not retrieved totalled 8,246, an increase of 47 percent; thus the total kill (34,779) increased 116 percent.

The survey indicated that the number of potential hunters increased slightly (3 percent) in the Atlantic Flyway. Although the number of active hunters decreased 4 percent, (table A-10, p. 51), the average number of times they hunted (3.7) increased 8 percent from the previous year, and their average seasonal bag (4.3 ducks per hunter) increased 23 percent.

WING COLLECTION SURVEY

Flyway-wide age ratios of the more important species of ducks in the kill during the 1959-60 and 1960-61 hunting seasons in the Atlantic Flyway are listed in table B-3 (p. 56).

A rather small collection of mallard wings made near Georgetown, S. C. in both 1959-60 and 1960-61 suggests an

increase in the proportion of immature to adult mallards in the kill (table B-2).

Age ratios of mallards and black ducks obtained in various parts of the Flyway are summarized in table B-5.

The species composition of the kill as represented by wings collected was compared with the waterfowl kill survey (table

A-2). Because all hunters did not receive the eastern questionnaire form, on which the black duck was listed, the waterfowl kill survey is assumed to have under-reported that species. Because of the importance of the black duck in the Atlantic Flyway, under-reporting them may have had the effect of causing mallards to appear

over-reported. As in the Mississippi Flyway, gadwalls, American widgeon, and ring-necked duck wings were received in relatively greater numbers than these species were reported on the questionnaire. Both surveys were in agreement that the wood duck was the third most important species in the hunter's bag.

WINTER SURVEY

FACTORS AFFECTING SURVEY

Excellent weather conditions prevailed throughout most of the survey period this year. At the time of the survey, fresh waters and many tidal areas in the northern part of the Flyway were frozen over, in contrast with 1960 when considerable open water was present. It is believed that with the birds more concentrated, due to the frozen conditions, a higher proportion of the birds present were tallied. Frozen conditions in the north undoubtedly forced many birds to winter farther south this year. For example, 22 percent of the dabbling ducks and 28 percent of the divers, or 25 percent if both groups are combined, were tallied for the area from Delaware north. In 1960, the percentages were 27, 35, and 31, respectively. Of the black duck population, 54 percent was tallied in the northern part of the Flyway in 1961 and 61 percent in 1960.

POPULATION TRENDS

Among the dabbling ducks, there was a small decrease in the black ducks, no

change in mallards, and a small increase in pintails.

Among the diving ducks, the important canvasback showed the rather substantial increase of 45 percent over last year. Due to offshore rafting and the difficulties of consistently locating flocks of redheads, the 128-percent increase recorded should be taken only as indicating a good increase. The important scaup also frequently rafts miles offshore and, consequently, it is difficult to locate consistently in some areas. It showed a slight increase of 13 percent. The ring-necked duck showed a slight decrease from last year.

Apparently, production in the Far North was good last year as demonstrated by the increases in geese and brant. The 41-percent increase recorded for Canada geese in the Flyway is particularly noteworthy. The brant is at about the highest level recorded in recent years. The coot population is about the same as last year.

The winter survey data are presented in appendix C: species composition and comparisons with 1960 in table C-11 (p. 68), and comparisons with previous years in tables C-12 and C-13 (p. 69), and in figures C-1 through C-5 (p. 70-74).

BREEDING GROUND SURVEY

MARITIME PROVINCES

Data supplied by A. J. Erskine,
Canadian Wildlife Service

WEATHER AND WATER CONDITIONS

No appreciable thaw occurred during the winter of 1960-61, and snow greatly above the average accumulated. In March

and April the mean temperatures averaged 3° below normal, and the snow and ice melted very gradually until early in May. Temperatures in May were generally normal or above normal, except where the proximity of sea ice kept the air cool; spring freshets on the Saint John River and certain smaller rivers were thus later and higher than average.

In general, water levels in breeding areas were 1 to 3 feet higher than in 1960

and some marshes covered a greater area because of the higher water levels. Precipitation was below normal in April, but close to normal in May; local heavy rains late in May promised continuing high-water levels into June.

BREEDING POPULATION INDEXES

Comparisons of numbers of waterfowl seen on breeding-pair surveys in 1960 and 1961 are presented in table E-32 (p. 101).

Increases in breeding population were recorded for black duck, green-winged teal, and ring-necked duck. There was little change in the populations of pintail, blue-winged teal, widgeon, and golden-eye.

CONCLUSIONS

It is estimated that there will be no appreciable change in the fall flight of ducks from the Maritime Provinces as compared with 1960.

NORTHEASTERN STATES

Data supplied by Maurice H. Lundy
and Howard L. Mendall,
Bureau of Sport Fisheries and
Wildlife

WEATHER AND WATER CONDITIONS

The Northeast experienced a cold, late spring. Abundant to excessive rainfall occurred over the entire region, especially along the Atlantic coast, with a deluge of from 4 to 7 inches of rainfall in northern, eastern, and central Maine from May 26 to May 28, 1961. Growth of vegetation was delayed in Massachusetts and water levels were above normal in May and June. Delaware, New Jersey, New York, and West Virginia reported abundant regular rainfall; rivers high in their banks, marshes well filled, and fresh-water ponds over flowing.

BREEDING POPULATION INDEXES

The breeding populations of black duck and mallard were estimated to be about the same as in 1960 or showed a slight decrease. Blue-winged teal and ring-necked duck increased substantially in number in Maine. Across the northern tier of States, wood duck, goldeneye, and hooded merganser remained about the same as in 1960. Massachusetts and Vermont reported nesting populations below the 1955-56 levels.

PRODUCTION INDEXES

Flooding from the late May downpour with resultant nest destruction curtailed waterfowl production in Maine. Some reduction in broods compared with their numbers in 1960 is anticipated, although renesting of black and ring-necked ducks may compensate in part for the earlier loss of broods. Brood sizes will be smaller from the re-nesting effort and many ducklings will be late getting on the wing. Except for an increase in Delaware, black duck broods either decreased in number or remained the same as in 1960. Wood duck showed up well with especially favorable reports from Pennsylvania, West Virginia, and Delaware.

Available information indicates the following nesting success of the more important species and the extent of nesting area in 1961 compared with 1960:

Black duck, significant decrease; wood duck, slight increase; ring-necked duck, slight decrease; mallard, significant decrease; and blue-winged teal, slight increase.

A marked increase in Canada goose production was reported in northwestern Pennsylvania and New York.

CONCLUSIONS

In view of the significant decreases in the important black duck as well as decreases in mallard and ring-necked duck in the Northeastern States, it is expected that the 1961 fall flight from those States will be smaller than that of last year.

SUMMARY AND FALL FLIGHT FORECAST

PACIFIC FLYWAY

SUMMARY

The number of ducks remaining after the shooting season in 1961 was little changed from that of 1960, as measured by the annual January survey of wintering areas. However, a considerable reduction occurred between 1959 and 1960. It is emphasized that although the number of birds available as breeders in 1961 was about the same as in 1960, it was considerably below the population present at the beginning of the 1959 season.

A small decrease in numbers of ducks was recorded during the May-June survey within the breeding range generally; however, a small increase was recorded within the part of the breeding range most important to the Pacific Flyway. This improvement was due primarily to a small increase in Alaska and a considerable increase in the survey area composed of northern Alberta and the western part of the Northwest Territories. The increased use of northern breeding areas this year was due to drought in pothole breeding habitat in the Prairie Provinces and in the Dakotas, which caused the birds to move on farther north to areas with better water conditions. Since many of the birds making up the increase came from southern Saskatchewan, southern Manitoba, and perhaps even as far south as the Dakotas, it is questionable that the increase was composed of birds that were in any respect related to the Pacific Flyway.

Weather and habitat conditions in the breeding areas important to the Flyway ranged from average to very poor. In Alaska the season was somewhat late in the central part of the State, and somewhat early from Bristol Bay north along the Bering Sea. Also, water levels in interior Alaska were the lowest observed in the past 7 years (although the significance of water levels in northern areas is not known at the present time). In northern Alberta and the Northwest Territories the season was late. Freezing conditions continued until mid-May, at which time temperatures rose rapidly. The sudden change caused rapid melting of a rather heavy snowpack and

resulted in the highest river levels on the Mackenzie since 1936. Waterfowl nesting along small streams south of the Arctic Circle and in the Mackenzie Delta was adversely affected by flooding. In southern Alberta and southern Saskatchewan, drought adversely affected breeding habitat, and by July 1961 the water areas in the southern portions of the two Provinces were reduced to an estimated 431,000; in July last year 1,319,000 were recorded in the same area. This year is drier than 1959 when ponds were estimated to number 735,000. When the 431,000 ponds of 1961 are compared with an estimated 4,354,000 in July 1955, the decrease in breeding habitat in this important production area is startling.

Production surveys during July 1961 reflected the general weather and habitat conditions in the various parts of the breeding range important to the Pacific Flyway. In Alaska, at least average production is expected and in view of the increase in breeding population, the fall flight of ducks is expected to be somewhat larger than last year. In northern Alberta and the Northwest Territories, brood counts made during July indicated a reduction of about 50 percent compared with counts made in 1960, despite the large increase in number of adult birds that were present this year. It is expected that the increase in adults will approximately equal the decrease in production and result in a fall flight about equal to last year's from this area. In southern Alberta, production was considerably less than during the drought year of 1959. Further, production was the lowest recorded since breeding-ground surveys were started. Comparatively, production was poorer in southern Saskatchewan than in southern Alberta. Elsewhere, in the breeding areas supplying the Flyway, the only bright spot was the State of Washington, where increases in both breeding population and production were recorded. In most other areas, drought prevailed and caused reduction in the estimated fall flight of ducks.

The situation is unfavorable again this year for canvasback and redhead. During 1960, a fair amount of overwater nesting

habitat was available as the result of the somewhat improved water conditions and the luxuriant vegetation that grew in many of the potholes. However, with the declining water levels this year the water withdrew from border vegetation in many ponds leaving exposed mudflats and open expanses of water. Due to severe reductions in suitable nesting habitat, production of canvasback and redhead is expected to be very low this year.

FLIGHT FORECAST

DUCKS

When data from all areas are combined, it is estimated that the small increases in breeding populations will not offset the marked reduction in number of young, with the result that there will be at least a moderate decrease in the 1961 fall flight of ducks in the Pacific Flyway. Since conditions on the breeding grounds contributing to the Flyway were not as good in 1961 as they were during the drought year of 1959, it is concluded that the decrease this year will exceed that recorded in 1959.

GESE AND BRANT

According to the annual winter survey, the goose population increased considerably

and may have reached the peak population of the past 13 years. All species increased, with Canada geese improving most (+52 percent). Breeding-population and production surveys of significant areas supplying the Great Basin Canada goose revealed increases in all areas except Idaho, where the number of breeders was the highest recorded in recent years, yet production was down about a fifth. On this basis, a small increase in the flight of Canada geese is expected this fall. Winter survey figures for snow, white-fronted, and cackling geese increased 28 percent, 8 percent, and 6 percent, respectively. Since production survey data are lacking for these species, average production is assumed. Therefore, the fall flight of these species is expected to be the same as last year but somewhat larger than in 1959.

The number of wintering brant increased for the second consecutive year. Limited surveys on brant breeding areas in Alaska indicated favorable conditions and good production. Therefore, a moderate increase in the fall flight of brant is expected.

COOT

Production of coot in all important breeding areas is expected to be markedly reduced by drought conditions. Therefore, a major reduction in the fall flight of coot is expected.

CENTRAL FLYWAY

SUMMARY

According to the winter survey in the Central Flyway, the number of ducks available as breeders at the beginning of the 1961 season was approximately the same as in 1960, but considerably below the number at the beginning of the 1959 season. It is perhaps significant that the recorded wintering population of mallards decreased 14 percent between January 1960 and January 1961, and that the 1961 level of this species is about 60 percent below the peak number recorded in 1958.

On the breeding grounds, the May-June surveys of areas important to the Central Flyway revealed a small decrease in the number of ducks. Decreases of major proportions were recorded in southern

Saskatchewan and southern Manitoba; smaller decreases were recorded in southern Alberta and in the Dakotas. These decreases were compensated in part by a major increase in northern Alberta and the Northwest Territories and by a small increase in Alaska. The increases in the North were obviously the result of drought in prairie and parkland pothole breeding habitat, which caused the birds to move on to areas with better water conditions farther north.

Weather and habitat conditions in the areas contributing to the Central Flyway were generally very poor. In July, severe drought reduced the number of water areas in the southern parts of the three Prairie Provinces, the Dakotas, and western Minnesota, to an estimated 911,000 ponds--a

decrease of 62 percent from 1960. When it is realized that more than 5.5 million ponds were estimated in this area in 1955, the degree to which drought has reduced available breeding habitat becomes obvious. In the north, spring breakup was late and in northern Alberta and the western part of the Northwest Territories there was considerable flooding. These conditions are not conducive to good production. Only in parts of Alaska were conditions judged to be favorable to the rearing of broods.

Production surveys during July 1961 reflected the adverse weather and habitat conditions that existed. Throughout the southern parts of Alberta, Saskatchewan, and Manitoba, and in the Dakotas and western Minnesota, the July surveys revealed less production than any year since breeding-ground surveys were started. Surveys in northern Alberta and the Northwest Territories indicate the possibility of a 50-percent reduction in number of broods as compared with last year. Drought is also expected to reduce production in Montana and Wyoming. In Nebraska water conditions were better and production is expected to about equal that of last year. Increases were noted in the northern parts of Saskatchewan and Manitoba, and in Ontario. In Alaska, production is expected to equal or exceed that of last year.

FLIGHT FORECAST

DUCKS

Viewed collectively, the increases in production are in no respect expected to balance the large decreases, and when coupled with a breeding population about equal in size to that of last year leads to

SUMMARY

During the January 1961 winter survey, the highest number of ducks in the Mississippi Flyway in the past 13 years was recorded. However, this figure must be interpreted before it can be used as an indicator of population change. Of greater significance is the mallard population which did not change noticeably from the number recorded last year. Age-ratio data collected

the conclusion that there will be a major decrease in the fall flight of ducks in the Central Flyway this year compared with 1960. Further, since production is judged to be less in 1961 than during the summer of 1959, due to greater severity of drought conditions, it is estimated that the decrease will exceed that recorded in the fall of 1959.

GEESE

The annual winter survey indicated a little decrease in the goose population in the Flyway, as compared with last year. A review of the winter trend data for geese reveals that although the population wintering in the Flyway has been fluctuating quite irregularly, there has been a downward trend in recent years. This downward trend is due to lesser numbers of snow, blue, and white-fronted geese, and not to a decrease in Canada geese.

Since goose production survey data are lacking, average production is assumed. Therefore, it is expected that the fall flights of these species will be the same as last year's. Compared with 1959, it is expected that the fall flight of Canada geese will be about the same; the flight of snow and blue geese will be somewhat smaller; and the flight of white-fronted geese will be markedly reduced.

COOT

The production of coot in all important breeding areas is expected to be markedly reduced by drought conditions. Therefore, a major reduction of this species in the fall flight is expected.

MISSISSIPPI FLYWAY

during the shooting season in 1959 and in 1960 revealed a considerably higher ratio of young to adults in 1960 than in 1959. It was estimated last year that production would be better than in 1959 but that the increased production would no more than balance the decrease in the number of breeders which resulted from the low production in 1959. When the kill data and the winter survey data for the 2 years are combined it appears that, for mallards at

least, the size of the fall flights was not markedly different. When this "no change" status is viewed in the light of the major decrease in the fall flight, which occurred in 1958 and 1959, it is significant that the mallard breeding population showed a marked reduction again this year in the Mississippi Flyway compared with 1959.

Surveys of breeding areas important to the Flyway during May and June revealed a small decrease in overall breeding population. Major decreases were recorded in southern Saskatchewan and southern Manitoba. Moderate decreases were recorded in southern Alberta and in the Dakotas. A small increase was recorded in Alaska and a major increase in northern Alberta and the western part of the Northwest Territories. These increases, however, were not sufficient to offset decreases elsewhere.

Weather and habitat conditions in the major areas supplying the Flyway were generally very poor. Drought conditions more severe than in 1959 were general throughout the southern parts of Alberta, Saskatchewan, and Manitoba, and in the Dakotas and western Minnesota. During July 1961, only 911,000 water areas were recorded in this region as compared with 2,432,000 last year. In July 1959, 1,551,000 areas were recorded in this region, which illustrates the comparative severity of drought conditions in 1961. When the 911,000 ponds estimated to be present this year are compared with approximately 5.5 million recorded in July 1955, the extent to which drought has reduced available breeding habitat becomes obvious. In northern breeding areas important to the Flyway freezing conditions continued well into May, causing a late spring throughout the northern parts of the prairie Provinces, in the Northwest Territories, and eastern Alaska. This late cold weather was followed by a rapid rise in temperature in mid-May. The heavy snowpack and rapid change from freezing conditions to high temperatures caused flooding and nest destruction in the Mackenzie River drainage in the western part of the Northwest Territories and in northern Alberta. The highest water levels since 1936 were recorded on the Mackenzie River Delta. Only in western Alaska from Bristol Bay north along the Bering Sea was the season early and habitat conditions good.

Production surveys during July have reflected the generally adverse weather and habitat conditions. Throughout the pothole breeding range in southern Alberta, southern Saskatchewan, southern Manitoba, the Dakotas, and western Minnesota, production is expected to be very poor this year. Production surveys in northern Alberta and the Northwest Territories have recorded 50 percent fewer broods despite the marked increase this year in the number of adult birds. In Alaska it is expected that production will equal that of last year or be somewhat better. In the northern portions of Saskatchewan and Manitoba, and in Ontario, production is expected to be moderately improved over last year's.

FLIGHT FORECAST

DUCKS

When breeding population and production data are combined for all areas in the Mississippi Flyway, the minor improvements are not expected to balance the major declines. Therefore, a major decline in the fall flight of ducks in 1961 as compared with 1960 is expected.

Since production is expected to be less than during the drought year of 1959, and since the breeding population is considerably smaller than it was in 1959, it is expected that the flight will be considerably smaller this fall than it was in 1959.

GEESE

The status of the goose populations in the Mississippi Flyway is quite favorable. The January survey indicated a major increase in 1961 as compared with 1960 and recorded the highest population of geese present in the Flyway during the past decade. A major increase was recorded for Canada geese (+34 percent). White-fronted geese doubled in population, although the numbers involved were relatively small. A moderate increase was recorded for blue geese and a small decrease for snow geese. Since breeding-ground surveys are not conducted for geese,

average production is assumed. Therefore, it is expected that the fall flights of all four species will be the same as last year. However, it is expected that the flight of Canada, blue, and white-fronted geese will be somewhat larger in 1961 as compared with 1959, while the flight of snow geese will be somewhat reduced.

COOT

Production of coot in all important breeding areas is expected to be markedly reduced as a result of drought. Therefore, a major reduction in the fall flight is expected in the Mississippi Flyway.

ATLANTIC FLYWAY

SUMMARY

In forecasting changes in the fall flight, breeding-ground survey data cannot be used to so great an extent in the Atlantic Flyway as in the other three Flyways. This is due primarily to a lack of adequate techniques for conducting surveys in the important Quebec-Labrador breeding area. Therefore, it is necessary to depend to a large extent on the results of the annual winter surveys for determining population trends in the Flyway.

The winter survey of January 1961 suggests some improvement in the number of ducks as compared with numbers in 1960 (+8 percent); however, an examination of winter survey data for the Atlantic Flyway (in Appendix C of this report) reveals that the improvement was due to increases in numbers of diving ducks, mostly scaup, redhead, and canvasback. Population gains in redhead and canvasback are encouraging, but the status of both species is still low due to loss of breeding habitat resulting from drought. Of greater significance is the decrease of 14 percent in black duck numbers after the small gain made by the species last year. Also, the numbers of mallard and pintail changed very little (-1 percent and +9 percent, respectively). It is evident that species contributing heavily to the duck kill in the Atlantic Flyway have made no recovery from the low populations recorded during the past 4 years.

The part of the Atlantic Flyway population coming from western breeding areas is expected to decrease this year. Severe drought in the Dakotas and the southern parts of the Prairie Provinces will markedly reduce the number of birds from these important areas. Although an increase in the number of adult birds in northern Alberta and the Northwest Territories

resulted from birds being displaced northward by drought in the prairies, the number of broods was much reduced. Only in Alaska, the northern parts of Saskatchewan and Manitoba, and in Ontario, is production expected to be better than last year, and these minor increases are not sufficient to balance the major decreases.

Since production survey data are lacking from Quebec and Labrador, it must be assumed that in this region production will be average. On this basis, it is estimated that the flight of black ducks will be the same as last year but somewhat below the 1959 flight. It is estimated that most other duck species in the Atlantic Flyway will be considerably reduced as compared with last year.

For canvasback, redhead, and ruddy duck, the situation is again unfavorable. During 1960, fair amount of over-water nesting habitat was available as a result of the somewhat improved water conditions and the luxuriant vegetation which grew in many of the potholes; however, declining water levels in many ponds this year left exposed mudflats and surrounding open expanses of water. Due to severe reduction of suitable nesting habitat, canvasback and redhead production is expected to be very low this year.

FLIGHT FORECAST

DUCKS

When all sources of information are combined, at least a moderate reduction in the fall flight of ducks is expected in the Atlantic Flyway. Further, the flight of ducks this fall will be considerably below the levels of the flights in the period 1952 through 1956.

GEESE

In contrast to the status of ducks, both the Canada goose and brant populations during the 1961 winter survey reached the peak levels recorded in at least the past decade. Since production data are lacking, average production is assumed. Therefore, for Canada geese and brant it is estimated that the fall flight will be about the same

as last year but moderately larger than the flight in 1959.

COOT

The production of coot in all important breeding areas is expected to be markedly reduced by drought conditions. Therefore, a major reduction in the fall flight of this species is expected.

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APPENDIX

A. WATERFOWL KILL SURVEY TABLES

BHL



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TABLE A-1.--Hunter response to questionnaire on hunting activity, season 1960-61

Flyway	Number of--		Hunters responding	
	Post office outlets	Hunters receiving questionnaire	Number	Percent
Pacific-----	160	9,033	6,344	70.2
Central-----	147	6,700	4,301	64.2
Mississippi ¹ -----	611	25,116	16,228	64.6
Atlantic ¹ -----	724	15,811	10,084	63.8
Total-----	1,642	56,660	36,839	65.0

¹Beginning with the 1957-58 season, the sample size was increased for certain States, who then carried part of the expense by cost contracts. Contracts for this additional sampling were in effect with 14 States in the Atlantic and Mississippi Flyways during the 1960-61 season.

TABLE A-2.--Percentage species composition of the duck kill, by Flyways, as indicated by wing collection survey and by mail questionnaire survey, hunting season 1960-61

Species	Mississippi Flyway		Atlantic Flyway	
	Wing collection	Questionnaire survey	Wing collection	Questionnaire survey
Mallard-----	51.2	52.0	14.7	18.7
Black-----	4.5	2.4	31.7	26.9
Black-mallard hybrid-----	0.2	0.0	0.0	0.0
Gadwall-----	1.9	0.9	1.2	0.5
American Widgeon (balldate)-----	4.9	2.8	4.2	3.6
Green-winged teal-----	6.1	8.5	8.3	6.4
Blue-winged teal-----	5.9	8.5	1.9	2.9
Shoveler-----	1.6	1.7	0.4	0.4
Pintail-----	4.4	4.2	2.7	3.2
Wood duck-----	4.8	5.8	12.5	11.5
Redhead-----	0.2	0.1	0.1	0.2
Canvasback-----	Trace	0.1	0.0	0.7
Greater scaup-----	1.0	8.1	3.8	6.0
Lesser scaup-----	3.7		1.2	
Ring-necked duck-----	7.0	1.9	5.6	2.2
Goldeneye-----	0.5	0.8	3.0	2.5
Bufflehead-----	0.8	0.5	1.9	3.4
Ruddy duck-----	0.6	0.5	0.4	1.6
American merganser-----	Trace	0.8	0.1	2.9
Red-breasted merganser-----	0.1		0.3	
Hooded merganser-----	0.3	0.3	1.6	6.2
Oldsquaw-----	0.1		2.2	
American scoter-----	Trace		0.8	
Surf scoter-----	0.1		1.2	
Unidentifiable-----	0.1		0.2	
Total-----	100.0	99.9	100.0	99.8

TABLE A-3.--Waterfowl kill in Pacific Flyway, seasons 1959-60 and 1960-61

Species	1959-60	1960-61	Percent change
Ducks:			
Dabblers:			
Pintail-----	398,027	502,422	+26.2
Mallard-----	761,155	711,778	-6.5
American widgeon-----	276,561	330,149	+19.4
Shoveler-----	95,566	164,996	+72.6
Gadwall-----	34,511	31,086	-9.9
Blue-winged teal-----	77,075	60,823	-21.1
Green-winged teal-----	265,995	255,490	-4.0
Cinnamon teal-----	40,095	1,595	-96.0
Wood duck-----	16,944	13,971	-17.6
Subtotal-----	1,965,929	2,072,310	+5.4
Divers:			
Scaup-----	45,936	63,339	+37.9
Canvasback-----	28,004	5,346	-80.9
Redhead-----	14,453	2,336	-83.8
Ring-necked duck-----	4,381	7,816	+78.4
Goldeneye-----	22,141	24,841	+12.2
Bufflehead-----	22,463	25,111	+11.8
Ruddy duck-----	23,967	27,604	+15.2
Subtotal-----	161,345	156,393	-3.1
Miscellaneous:			
Scooter-----	8,719	6,648	-23.8
Merganser-----	11,253	9,838	-12.6
Other ² -----	302	876	+190.1
Subtotal-----	20,274	17,362	-14.4
Total:			
Retrieved-----	2,147,548	2,246,065	+4.6
Not retrieved-----	294,764	359,779	+22.1
Ducks killed-----	2,442,312	2,605,844	+6.7
Geese:			
Canada goose-----	72,775	81,012	+11.3
Snow goose-----	49,676	78,179	+57.4
White-fronted goose-----	33,451	63,039	+88.4
Cackling goose-----	52,465	15,628	-70.2
Brant ¹ -----	6,418	17,619	+174.5
Other ³ -----	86	4,426	++
Total:			
Retrieved-----	214,871	259,903	+21.0
Not retrieved-----	37,217	45,355	+21.9
Geese killed-----	252,088	305,258	+21.1
Coot:			
Total:			
Retrieved-----	57,651	59,476	+3.2
Not retrieved-----	30,506	30,128	-1.2
Coot killed-----	88,157	89,604	+1.6

¹ Estimate for 1960-61 considered unreliable; see page 2.² Includes black ducks reported from Arizona, that presumably were Mexican ducks.³ Mostly blue geese.

TABLE A-4.--Hunting statistics, Pacific Flyway, seasons 1959-60 and 1960-61

	1960-61	1959-60	Percent change
Number of hunters:			
Potential:			
16 yrs. and older ¹ -----	282,201	284,409	-0.8
Under 16 yrs.-----	24,231	27,184	-10.9
Total-----	306,432	311,593	-1.7
Active: ²			
16 yrs. and older-----	228,334	236,259	-3.4
Under 16 yrs.-----	18,500	21,701	-14.8
Total-----	246,834	257,960	-4.3
Average times hunted ² -----	4.175	4.396	-5.0
Average seasonal kill: ²			
Retrieved birds, shot by--			
Hunters 16 yrs. and older:			
Ducks-----	9.417	8.730	+7.9
Geese-----	1.106	.878	+26.0
Coot-----	.212	.193	+9.8
Hunters under 16 yrs.:			
Ducks-----	5.184	3.915	+32.4
Geese-----	.404	.341	+18.5
Coot-----	.598	.553	+8.1
Unretrieved birds, shot by-- ²			
Hunters 16 yrs. and older:			
Ducks-----	1.511	1.161	+30.2
Geese-----	.198	.150	+32.0
Coot-----	.107	.114	-6.1
Hunters under 16 yrs.:			
Ducks-----	.803	.945	-15.0
Geese-----	.006	.080	-92.5
Coot-----	.305	.166	+83.7
Average daily bag of ²			
Hunters 16 yrs. and older:			
Ducks-----	2.256	1.986	+13.6
Geese-----	.265	.200	+32.5
Coot-----	.051	.044	+15.9
Hunters under 16 yrs.:			
Ducks-----	1.242	.891	+39.4
Geese-----	.097	.078	+24.4
Coot-----	.143	.126	+13.5

¹ Purchased a duck stamp with intent to hunt.

² Hunted at least once.

TABLE A-5.--Waterfowl kill in Central Flyway, seasons 1959-60 and 1960-61

Species	1959-60	1960-61	Percent change
Ducks:			
Dabblers:			
Pintail-----	126,224	143,114	+13.4
Mallard-----	694,563	690,988	-.5
American widgeon-----	28,550	46,699	+63.6
Shoveler-----	34,074	53,322	+56.5
Gadwall-----	23,715	37,382	+57.6
Blue-winged teal-----	116,210	102,196	-12.1
Green-winged teal-----	186,008	188,691	+1.4
Cinnamon teal ¹ -----	11,018	3,382	--
Black duck ² -----	1,320	16,390	--
Wood duck-----	13,084	12,489	-4.6
Subtotal-----	1,234,766	1,294,653	+4.8
Divers:			
Scaup-----	108,032	59,482	-44.9
Canvasback-----	33,744	4,280	-87.3
Redhead-----	25,738	1,347	94.8
Ring-necked duck-----	14,419	14,285	-.9
Goldeneye-----	2,912	7,142	+145.3
Bufflehead-----	5,509	7,521	+36.5
Ruddy duck-----	4,749	7,142	+50.4
Subtotal-----	195,103	101,199	-48.2
Miscellaneous:			
Scooter-----	502	225	-55.2
Merganser-----	3,630	7,142	+96.8
Other-----	689	--	--
Subtotal-----	4,821	7,367	+52.8
Total:			
Retrieved-----	1,434,690	1,403,219	-2.2
Not retrieved-----	206,647	376,724	+82.3
Ducks killed-----	1,641,337	1,779,943	+8.4
Geese:			
Canada goose-----	⁴ 126,611	³ 129,956	+2.6
Snow goose-----	51,774	47,420	-8.4
White-fronted goose-----	13,208	17,901	+35.5
Blue goose-----	20,111	19,623	-2.4
Other-----	1,357	--	--
Total:			
Retrieved-----	213,061	214,900	.9
Not retrieved-----	30,503	48,529	+59.1
Geese killed-----	243,564	263,429	+8.2
Coot:			
Total:			
Retrieved-----	16,240	24,236	+49.2
Not retrieved-----	11,528	21,856	+89.6
Coot killed-----	27,768	46,092	+66.0

¹ Estimate for 1961 considered unreliable; see page 2.² Mottled duck included under black duck.³ Includes 34,081 small white-cheeked geese reported as Hutchin's or cackling geese.⁴ Includes 15,053 small white-cheeked geese reported as Hutchin's or cackling geese.

TABLE A-6.--Hunting statistics, Central Flyway, seasons 1959-60 and 1960-61

	1960-61	1959-60	Percent change
Number of hunters:			
Potential:			
16 yrs. and older ¹	368,421	363,539	+1.3
Under 16 yrs.	34,399	38,740	-11.2
Total-----	402,820	402,279	+.1
Active: ²			
16 yrs. and older-----	281,851	290,897	-3.1
Under 16 yrs.	24,643	27,218	-9.5
Total-----	306,494	318,115	-3.6
Average times hunted ² -----	3.772	3.278	+15.1
Average seasonal kill: ²			
Retrieved birds, shot by--			
Hunters 16 yrs. and older:			
Ducks-----	4.815	4.745	+1.5
Geese-----	.742	.715	+3.8
Coot-----	.078	.049	+59.2
Hunters under 16 yrs.:			
Ducks-----	1.870	1.996	-6.3
Geese-----	.125	.187	-33.2
Coot-----	.051	.075	-32.0
Unretrieved birds, shot by--			
Hunters 16 yrs. and older:			
Ducks-----	1.300	.656	+98.2
Geese-----	.171	.098	+74.5
Coot-----	.075	.036	+108.3
Hunters under 16 yrs.:			
Ducks-----	.187	.581	-67.8
Geese-----	.017	.069	-75.4
Coot-----	.030	.040	-25.0
Average daily bag of ² -----			
Hunters 16 yrs. and older:			
Ducks-----	1.277	1.448	-11.8
Geese-----	.197	.218	-9.6
Coot-----	.021	.015	+40.0
Hunters under 16 yrs.:			
Ducks-----	.496	.609	-18.6
Geese-----	.033	.057	-42.1
Coot-----	.014	.023	-39.1

¹ Purchased a duck stamp with intent to hunt.² Hunted at least once.

TABLE A-7.--Waterfowl kill in Mississippi Flyway, seasons 1959-60 and 1960-61

Species	1959-60	1960-61	Percent change
Ducks:			
Dabblers:			
Pintail-----	120,455	125,893	+4.5
Mallard-----	1,279,578	1,548,751	+21.0
American widgeon-----	59,990	83,569	+39.3
Shoveler-----	24,076	49,970	+107.5
Gadwall-----	21,100	27,349	+29.7
Blue-winged teal-----	243,284	253,101	+4.0
Green-winged teal-----	240,228	253,528	+5.5
Black duck ¹ -----	125,141	70,017	--
Wood duck-----	141,047	173,779	+23.2
Subtotal-----	2,254,899	2,585,957	+14.6
Divers:			
Scaup-----	322,896	240,444	-25.5
Canvasback-----	37,624	4,060	-89.2
Redhead-----	29,805	4,085	-86.3
Ring-necked duck-----	51,515	56,597	+9.9
Goldeneye-----	24,320	23,194	-4.6
Bufflehead-----	22,774	14,232	-37.5
Ruddy duck-----	10,365	16,005	+54.4
Subtotal-----	499,299	358,617	-28.2
Miscellaneous:			
Scoter-----	2,647	--	--
Merganser-----	30,302	23,374	-22.9
Other-----	1,033	9,463	+816.1
Subtotal-----	33,982	32,837	-3.4
Total:			
Retrieved-----	2,788,180	2,977,411	+6.8
Not retrieved-----	716,160	778,213	+8.7
Ducks killed-----	3,504,340	3,755,624	+7.2
Geese:			
Canada goose-----	140,421	114,773	-18.3
Snow goose-----	31,962	17,626	-44.9
White-fronted goose-----	15,165	5,650	-62.7
Blue goose-----	59,041	34,881	-40.9
Hutchins's goose ¹ -----	--	5,060	
Total:			
Retrieved-----	246,589	177,990	-27.8
Not retrieved-----	62,183	34,532	-44.5
Geese killed-----	308,772	212,522	-31.2
Coot:			
Total:			
Retrieved-----	82,663	195,112	+136.0
Not retrieved-----	47,943	60,907	+27.0
Coot killed-----	130,606	256,019	+96.0

¹ Estimate for 1960-61 considered unreliable; see page 2.

TABLE A-8.--Hunting statistics, Mississippi Flyway, seasons 1959-60 and 1960-61

	1960-61	1959-60	Percent change
Number of hunters:			
Potential:			
16 yrs. and older ¹	101,535	694,516	+1.0
Under 16 yrs.	54,351	55,768	-2.5
Total	55,886	750,284	+0.8
Active: ²			
16 yrs. and older	71,637	604,232	-5.4
Under 16 yrs.	40,739	42,752	-4.7
Total	12,376	646,984	-5.4
Average times hunted ²	3.988	3.874	+2.9
Average seasonal killed: ²			
Retrieved birds, shot by--			
Hunters 16 yrs. and older:			
Ducks	5.014	4.152	+20.8
Geese	.303	.396	-23.5
Coot	.310	.122	+154.1
Hunters under 16 yrs.:			
Ducks	2.728	2.375	+14.9
Geese	.122	.170	-28.2
Coot	.442	.204	+116.7
Unretrieved birds, shot by-- ²			
Hunters 16 yrs. and older:			
Ducks	1.304	1.136	+14.8
Geese	.057	.099	-42.4
Coot	.096	.071	+35.2
Hunters under 16 yrs.:			
Ducks	.805	.700	+15.0
Geese	.047	.056	-16.1
Coot	.150	.117	+28.2
Average daily bag of-- ²			
Hunters 16 yrs. and older:			
Ducks	1.257	1.072	+17.3
Geese	.076	.102	-25.5
Coot	.078	.031	+151.6
Hunters under 16 yrs.:			
Ducks	.684	.613	+11.6
Geese	.031	.044	-29.6
Coot	.111	.053	+109.4

¹ Purchased a duck stamp with intent to hunt.

² Hunted at least once.

TABLE A-9.--Waterfowl kill in Atlantic Flyway, seasons 1959-60 and 1960-61

Species	1959-60	1960-61	Percent change
Ducks:			
Dabblers:			
Pintail-----	22,729	26,217	+15.3
Mallard-----	120,734	151,313	+25.3
American widgeon-----	22,633	29,397	+29.9
Shoveler-----	2,325	3,560	+15.1
Gadwall-----	4,008	4,216	+5.2
Blue-winged teal-----	22,824	23,271	+2.0
Green-winged teal-----	35,457	52,013	+46.7
Black duck ¹ -----	177,488	217,582	--
Wood duck-----	73,511	93,094	+26.6
Subtotal-----	481,709	600,663	+24.6
Divers:			
Scaup-----	55,609	48,897	-12.1
Canvasback-----	15,237	5,672	-62.8
Redhead-----	7,008	1,675	-76.1
Ring-necked duck-----	16,436	17,834	+8.5
Goldeneye-----	19,579	20,245	+3.4
Bufflehead-----	21,031	27,172	+29.2
Ruddy duck-----	5,440	13,197	+142.6
Subtotal-----	140,340	134,692	-4.1
Miscellaneous:			
Scoter-----	32,396	41,866	+29.2
Merganser-----	24,944	23,636	-5.2
Other ² -----	2,339	8,302	+254.9
Subtotal-----	59,679	73,804	+23.6
Total:			
Retrieved-----	681,728	809,159	+18.7
Not retrieved-----	160,147	181,606	+13.4
Ducks killed-----	841,875	990,765	+17.7
Geese:			
Canada goose-----	38,996	68,395	+75.4
Brant ¹ -----	20,409	26,883	+31.7
Other ³ -----	397	1,230	+209.8
Total:			
Retrieved-----	59,802	96,508	+61.4
Not retrieved-----	12,574	10,631	-15.4
Geese killed-----	72,376	107,139	+48.0
Coot:			
Total:			
Retrieved-----	10,525	26,533	+152.1
Not retrieved-----	5,608	8,246	+47.0
Coot killed-----	16,133	34,779	+115.6

¹ Estimate for 1960-61 considered unreliable; see page 2.² Mostly oldsquaw and eider ducks.³ Mostly blue geese.

TABLE A-10. --Hunting statistics, Atlantic Flyway, seasons 1959-60 and 1960-61

	1960-61	1959-60	Percent change
Number of hunters:			
Potential:			
16 yrs. and older ¹ -----	239,845	229,158	+4.7
Under 16 yrs-----	12,713	15,015	-15.3
Total-----	252,558	244,173	+3.4
Active: ²			
16 yrs. and older-----	184,254	190,561	-3.3
Under 16 yrs-----	8,742	10,408	-16.0
Total-----	192,996	200,969	-4.0
Average times hunted ² -----	3.728	3.442	+8.3
Average seasonal kill: ²			
Retrieved birds, shot by--			
Hunters 16 yrs. and older:			
Ducks-----	4.307	3.506	+22.8
Geese-----	.514	.304	+69.1
Coot-----	.137	.050	+174.0
Hunters under 16 yrs.:			
Ducks-----	1.772	1.300	+36.3
Geese-----	.206	.173	+19.1
Coot-----	.139	.092	+51.1
Unretrieved birds, shot by-- ²			
Hunters 16 yrs. and older:			
Ducks-----	.959	.818	+17.2
Geese-----	.056	.064	-12.5
Coot-----	.042	.028	+50.0
Hunters under 16 yrs.:			
Ducks-----	.568	.406	+39.9
Geese-----	.032	.042	-23.8
Coot-----	.069	.020	+245.0
Average daily bag of-- ²			
Hunters 16 yrs. and older:			
Ducks-----	1.155	1.019	+13.4
Geese-----	.138	.088	+56.8
Coot-----	.037	.015	+146.7
Hunters under 16 yrs.:			
Ducks-----	.475	.378	+25.7
Geese-----	.055	.050	+10.0
Coot-----	.037	.027	+37.0

¹ Purchased a duck stamp with intent to hunt.

² Hunted at least once.

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B. WING COLLECTION SURVEY

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TABLE B-1.--Hunters contacted and wings received in wing collections, hunting seasons 1959-60 and 1960-61

Flyway	Number of--			
	Hunters contacted		Wings received	
	1959-60	1960-61	1959-60	1960-61
Mississippi-----	7,997	10,316	10,545	23,019
Atlantic-----	--	8,599	--	13,306
Total-----	7,997	18,915	10,545	36,325

TABLE B-2.--Age ratios of mallard and pintail determined from supplemental wing collections, hunting seasons 1959-60 and 1960-61

Area	Number of--			
	Wings received		Immatures per adult	
	1959-60	1960-61	1959-60	1960-61
MALLARD				
Pacific Flyway:				
Columbia Refuge, Wash-----	--	154	--	1.70
Skagit Delta, Wash-----	--	615	--	3.30
Sauvie Island, Oreg-----	--	633	--	2.44
Merced, Calif-----	573	737	2.57	2.76
Tule Lake, Calif-----	313	113	0.35	0.98
Willows, Calif. (Colusa-Sutter)	1,303	1,218	1.61	1.97
Nampa, Idaho-----	89	1,285	1.61	1.34
Bear River, Utah-----	140	161	0.37	1.06
Central Flyway:				
Jamestown, N. Dak-----	--	81	--	1.45
Lower Souris, N. Dak-----	21	488	0.82	1.71
Minot, N. Dak-----	--	139	--	1.90
Mississippi Flyway:				
Locke plant, Stuttgart, Ark----	867	430	0.33	1.22
Atlantic Flyway:				
Georgetown, S. C-----	69	134	1.22	1.79
PINTAIL				
Pacific Flyway:				
Merced, Calif-----	--	414	--	1.35
Tule Lake, Calif-----	131	259	0.29	1.82
Willows, Calif-----	1,259	1,422	0.48	1.52
Bear River, Utah-----	273	232	0.15	0.68

¹ Includes 1,098 wings from Idaho Game Department, collected in the Boise Valley, Idaho.

TABLE B-3.--Age ratios, by species, determined from wing collections, Mississippi and Atlantic Flyways, hunting seasons 1959-60 and 1960-61

Species	Number of--						
	Wings received			Immatures per adult ¹			
	Mississippi Flyway		Atlantic Flyway 1960-61	Mississippi Flyway		Atlantic Flyway	
	1959-60	1960-61		1959-60	1960-61	1960-61	1960-61
Mallard-----	4,592	12,471	1,697	0.77	1.84	2.52	
Black duck-----	455	1,275	4,953	2.10	1.83	2.10	
Gadwall-----	197	406	92	1.39	3.63		3.98
American widgeon-----	450	894	452	1.60	3.45	1.30	
Green-winged teal-----	688	984	1,027	1.95	3.43	2.57	
Blue-winged teal-----	587	761	188	1.59	2.29	2.58	
Shoveler-----	75	280	40	2.34	5.76		2 12.48
Pintail-----	331	788	315	1.12	1.88	1.92	
Wood duck-----	411	1,044	1,275	1.45	2.09	2.08	
Greater scaup-----	121	170	463	2.20	2.42	2.29	
Lesser scaup-----	1,010	541	127	1.17	2.30	1.75	
Ring-necked duck-----	507	877	405	1.47	2.96	2.11	
Bufflehead-----	133	123	282	2.02	2.09	0.97	
Goldeneye-----	--	--	429	--	--	1.19	

¹ Data from each State contributing to Flyway-wide age ratio weighted in proportion to estimated size of the kill.

² Sample size too small for reliable estimate.

TABLE B-4.--Age ratios of mallard determined from wing collections, Mississippi Flyway, hunting seasons 1959-60 and 1960-61

Location of kill	Number of--			
	Wings received		Immature per Adult	
	1959-60	1960-61	1959-60	1960-61
Minnesota-----	1,102	1,044	1.2	3.0
Wisconsin-----	344	1,021	2.1	3.3
Michigan-----	153	427	2.6	4.1
Iowa-----	182	536	0.5	1.8
Illinois-----	817	1,249	0.6	1.3
Indiana-----	32	524	1.5	0.9
Ohio-----	130	354	1.6	2.7
Missouri-----	539	1,301	0.5	1.3
Kentucky-----	11	574	--	0.8
Arkansas-----	901	2,787	0.5	1.3
Tennessee-----	182	1,181	0.5	1.1
Louisiana-----	140	719	0.6	1.3
Mississippi-----	42	479	0.6	0.9
Alabama-----	17	274	--	2.9

TABLE B-5. -- Age ratios of black duck and mallard determined from wing collections, Atlantic Flyway, hunting seasons 1959-60 and 1960-61

Location of kill	Number of--			
	Wings received		Immatures per adult	
	Black duck	Mallard	Black duck	Mallard
Maine-----	878	34	3.0	4.7
New Hampshire-----	71	10	4.9	--
Vermont-----	233	55	5.5	5.9
All wings-----	1,182	99	3.44	4.21
Massachusetts-----	636	96	2.2	2.6
Rhode Island-----	159	9	1.9	--
Connecticut-----	183	52	2.4	4.2
All wings-----	978	157	2.20	3.03
New York-----	435	280	2.7	5.0
Pennsylvania-----	114	190	1.8	4.1
West Virginia-----	66	33	0.6	1.1
All wings-----	615	503	2.09	3.93
New Jersey-----	1,138	215	1.9	2.2
Delaware-----	200	58	1.2	1.4
Maryland-----	378	172	1.4	1.6
All wings-----	1,716	445	1.72	1.83
Virginia-----	161	117	1.6	1.9
North Carolina-----	228	148	1.5	1.3
South Carolina-----	46	108	1.6	1.3
All wings-----	435	373	1.56	1.47
Georgia-----	2	6	--	--
Florida-----	25	24	4.0	2.4
All wings-----	27	30	(4.40)	1.73

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C. WINTER SURVEY TABLES AND CHARTS

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TABLE C-1.--Participation in winter survey, 1961

Location	Number of observers				Aerial coverage			Nonaerial miles traveled
	United States	State	Other	Total	Number of Planes	Hours flown	Miles flown	
United States:								
Pacific Flyway-----	36	306	9	351	36	160	15,665	28,367
Central Flyway-----	61	253	16	330	35	222	21,638	27,884
Mississippi Flyway-----	82	649	27	758	66	275	23,900	42,673
Atlantic Flyway-----	49	98	7	154	31	252	24,000	6,500
Alaska-----	2	1	--	3	1	20	2,420	--
Total-----	230	1,307	59	1,596	169	929	87,623	105,424
Canada-----	--	--	--	55	5	?	?	?
Mexico-----	7	--	--	7	3	134	16,932	--
Grand total-----	237	1,307	59	1,658	177	1,063	103,655	105,424

TABLE C-2.--Number of birds, by species, Pacific Flyway extended, winter survey, 1960 and 1961
 [Comparable coverage]

Species	1960		1961		Percent change
	Number	Percent	Number	Percent	
Ducks:					
Dabblers:					
Pintail-----	2,534,386	26.8	2,711,467	26.9	+7
Mallard-----	2,189,300	23.2	2,147,752	21.3	-2
American widgeon-----	1,229,205	13.0	1,240,709	12.3	+1
Shoveler-----	496,462	5.3	402,470	4.0	-19
Gadwall-----	89,778	.9	47,796	.5	-47
Blue-winged teal-----	28,954	.3	60,724	.6	+110
Green-winged teal-----	399,145	4.2	397,746	4.0	No change
Wood duck-----	1,525	Trace	1,609	Trace	--
Subtotal-----	6,968,755	73.7	7,010,273	69.6	+1
Divers:					
Scaup-----	186,916	2.0	203,166	2.0	+9
Canvasback-----	51,463	.5	57,291	.6	+11
Redhead-----	29,111	.3	43,499	.4	+49
Ring-necked duck-----	4,562	Trace	5,209	.1	+14
Goldeneye-----	53,643	.6	43,450	.4	-19
Bufflehead-----	31,748	.3	33,531	.3	+6
Ruddy duck-----	125,830	1.3	97,320	1.0	-23
Subtotal-----	483,273	5.0	483,466	4.8	No change
Miscellaneous:					
Scoter and eider-----	72,315	.8	89,699	.9	+24
Oldsquaw-----	840	Trace	347	Trace	--
Merganser-----	17,868	.2	33,851	.3	+89
Subtotal-----	91,023	1.0	123,897	1.2	+36
Total ducks-----	7,543,051	79.7	7,617,636	75.6	+1
Geese:					
Canada goose-----	186,488	2.0	284,299	2.8	+52
Snow goose-----	360,363	3.8	460,922	4.6	+28
White-fronted goose-----	172,368	1.8	185,596	1.8	+8
Ross's goose-----	7,010	.1	2,637	Trace	--
Cackling goose-----	156,170	1.7	165,929	1.6	+6
Total geese-----	882,399	9.4	1,099,383	10.8	+25
Black brant-----	136,983	1.4	174,770	1.7	+28
Swan:					
Whistling swan-----	35,731	.4	41,184	.4	+15
Trumpeter swan-----	570	Trace	325	Trace	-43
Total swan-----	36,301	.4	41,509	.4	+14
Coot-----	855,736	9.1	1,157,653	11.5	+35
All species:					
Total identified-----	9,454,470	100.0	10,090,951	100.0	+7
Miscellaneous and unidentified-----	¹ 214,378		² 160,055		
Grand total-----	9,668,848		10,251,006		+6

¹ Includes 150 mottled ducks, 4,458 cinnamon teal, and 27,595 tree ducks, in addition to unidentified species.

² Includes 13,943 cinnamon teal and 31,685 tree ducks, in addition to unidentified species.

TABLE C-3. --Distribution of wintering waterfowl, Pacific Flyway extended, 1956-61

[Index numbers]

Area	1956	1957	1958	1959	1960	1961
Alaska-----	19,365	29,120	30,051	31,941	15,420	24,194
British Columbia-----	451,736	29,748	81,776	56,364	63,903	153,980
Washington-----	553,676	757,324	1,087,444	1,123,077	1,225,126	1,291,347
Oregon-----	485,500	711,811	638,463	998,266	1,018,989	1,034,976
California-----	6,574,146	5,177,984	6,681,382	6,326,609	5,072,667	5,396,143
Idaho-----	479,247	392,140	434,274	705,764	578,351	553,390
Nevada-----	56,744	57,298	99,976	204,688	58,998	54,782
Utah-----	163,516	98,040	158,740	101,703	39,895	68,307
Arizona-----	55,709	80,561	46,960	67,221	64,292	54,877
Mexico: West coast-----	976,830	¹ 81,435	1,139,797	1,870,730	1,531,207	1,623,317
Total-----	9,816,469	7,435,461	10,398,863	11,486,453	9,668,848	10,255,313
Comparable coverage:						
1956-1957-----	9,482,793	7,427,176	--	--	--	--
1957-1958-----	--	7,435,176	9,330,371	--	--	--
1958-1959-----	--	--	10,398,863	11,486,453	--	--
1959-1960-----	--	--	--	11,478,654	9,637,563	--
1960-1961-----	--	--	--	--	9,668,848	10,251,006

¹ Baja California only.

TABLE C-4. --Trend in waterfowl numbers, Pacific Flyway extended, winter survey, 1949-61

[In thousands]

Year	Ducks	Geese	Brant	Swan	Coot	Total
1949-----	9,008	980	123	17	773	10,901
1950-----	7,082	730	144	18	407	8,381
1951-----	6,619	¹ 1,000	151	33	769	8,572
1952-----	6,646	917	167	20	520	8,270
1953-----	7,352	952	154	29	796	9,283
1954-----	7,813	884	132	28	1,169	10,026
1955-----	7,288	872	135	36	717	9,048
1956-----	7,929	961	110	48	885	9,933
1957-----	² 6,593	749	128	44	952	8,466
1958-----	8,582	800	126	51	815	10,394
1959-----	9,452	918	68	40	1,007	11,485
1960-----	7,760	883	105	36	859	9,643
1961-----	7,780	1,100	134	41	1,162	10,217

Note.--Coverage during the period was not comparable and the data were adjusted, using 1959 and 1955 as base years. It was assumed that areas where comparable surveys were conducted provided an accurate measure of the percentage change between 2 consecutive years. On this basis, population estimates were calculated backward and forward from the base years.

¹ Index arbitrarily reduced from 1,797,000 to 1 million geese. During January 1951, more geese were estimated to be in Merced County, California, than were in the entire flyway either the previous or the following year. It seems certain that the estimate was in error. If the geese recorded in Merced County are deleted from the totals for 1950, 1951, and 1952, and a revised estimate is calculated based on change observed in the remaining areas, the index for 1951 is about 1 million birds.

²No surveys were conducted in Mexico in 1957. The data indicate that it is unlikely that surveys in the United States, Canada, and Alaska accurately revealed the trend in wintering populations of ducks that year.

TABLE C-5.--Number of birds, by species, Central Flyway extended, winter survey, 1960 and 1961

[Comparable coverage]

Species	1960		1961		Percent change
	Number	Percent	Number	Percent	
Ducks:					
Dabblers:					
Pintail-----	898,233	17.2	949,649	16.8	+6
Mallard-----	1,963,762	37.5	1,698,231	30.1	-14
American widgeon-----	261,070	5.0	341,313	6.0	+31
Shoveler-----	69,960	1.3	93,134	1.6	+33
Gadwall-----	55,589	1.1	86,018	1.5	+55
Blue-winged teal-----	125,165	2.4	198,897	3.5	+60
Green-winged teal-----	190,550	3.6	215,572	3.8	+13
Tree duck-----	13,180	.3	2,843	.1	-78
Mottled duck-----	2,730	.1	8,950	.2	+228
Wood duck-----	654	Trace	1,353	Trace	+107
Subtotal-----	3,580,893	68.5	3,595,960	63.6	No change
Divers:					
Scaup-----	272,056	5.2	89,183	1.6	-67
Canvasback-----	26,739	.5	15,433	.3	-42
Redhead-----	231,559	4.4	614,412	10.9	+165
Ring-necked duck-----	3,508	.1	2,018	Trace	-42
Goldeneye-----	13,118	.3	18,273	.3	+39
Bufflehead-----	802	Trace	1,411	Trace	+76
Ruddy duck-----	16,807	.3	10,349	.2	-38
Subtotal-----	564,589	10.8	751,079	13.3	+33
Miscellaneous:					
Scooter-----	11	Trace	--	--	--
Merganser-----	59,896	1.1	75,417	1.3	+26
Subtotal-----	59,907	1.1	75,417	1.3	+26
Total ducks-----	4,205,389	80.4	4,422,456	78.2	+5
Geese:					
Canada goose-----	159,209	3.0	164,538	2.9	+3
Snow goose-----	231,079	4.4	215,186	3.8	-7
White-fronted goose-----	30,048	.6	14,779	.3	-51
Blue goose-----	75,477	1.4	61,556	1.1	-18
Total geese-----	495,813	9.4	456,059	8.1	-8
Swan:					
Whistling swan-----	36	Trace	53	Trace	+47
Trumpeterswan-----	129	Trace	264	Trace	+105
Total swan-----	165		317		+92
Coot-----	532,475	10.2	782,743	13.8	+47
All species:					
Total identified-----	5,233,842	100.0	5,661,575	100.1	+8
Miscellaneous and unidentified-----	37,997	--	28,297	--	--
Grand total-----	5,271,839	--	5,689,872	--	+8

TABLE C-6.--Distribution of wintering waterfowl, Central Flyway extended, 1956-61

[Index numbers]

Area	1956	1957	1958	1959	1960	1961
Montana-----	53,454	80,087	110,461	127,791	74,331	89,009
North Dakota-----	3,165	7,485	34,041	2,100	31	2,127
South Dakota-----	56,183	354,898	1,361,951	605,243	93,638	353,967
Wyoming-----	65,700	85,794	67,246	75,700	79,662	51,620
Nebraska-----	230,057	363,248	589,858	331,855	306,412	204,039
Colorado-----	283,266	583,326	722,718	473,669	437,045	387,710
Kansas-----	273,163	405,132	643,340	355,447	379,557	492,326
New Mexico-----	114,892	145,636	103,440	143,111	82,373	93,343
Oklahoma-----	111,113	62,851	124,825	193,685	114,211	106,278
Texas-----	5,328,771	1,633,846	3,581,556	3,675,032	2,384,384	2,109,680
Mexico:						
East coast-----	2,070,750	--	1,609,110	1,268,048	817,896	1,344,340
Central-----	945,204	--	546,637	1,097,771	518,181	522,803
Central America-----	--	--	--	--	28,470	--
Northern South America-----	--	--	--	--	475,254	--
Total-----	9,541,718	3,722,303	9,495,183	8,349,452	5,791,445	5,757,242
Comparable coverage:						
1956-1957-----	6,495,774	3,631,478	--	--	--	--
1957-1958-----	--	3,696,773	7,057,996	--	--	--
1958-1959-----	--	--	9,495,183	8,263,472	--	--
1959-1960-----	--	--	--	8,334,711	5,268,271	--
1960-1961-----	--	--	--	--	5,271,839	5,689,872

TABLE C-7.--Trend in waterfowl numbers, Central Flyway extended, winter survey, 1949-61

[In thousands]

Year	Ducks	Geese	Coot	Total
1949-----	4,256	1,031	1,139	6,426
1950-----	5,542	839	615	6,996
1951-----	4,733	507	375	5,615
1952-----	6,116	409	1,017	7,542
1953-----	5,591	512	578	6,681
1954-----	6,441	723	1,322	8,486
1955-----	5,746	521	594	6,861
1956-----	7,814	693	1,025	9,532
1957----- ¹	4,248	443	364	5,055
1958-----	8,202	567	812	9,581
1959-----	7,233	425	691	8,349
1960-----	4,240	501	536	5,277
1961-----	4,447	461	788	5,696

Note.--Coverage during the period was not comparable and the data were adjusted, using 1959 and 1955 as base years. It was assumed that areas where comparable surveys were conducted provided an accurate measure of the percentage change between 2 consecutive years. On this basis, population estimates were calculated backward and forward from the base years.

¹ No surveys were conducted in Mexico in 1957. The data indicate that it is unlikely that surveys in the United States alone accurately revealed the trend in wintering population for either ducks or coot that year.

TABLE C-8.--Number of birds, by species, Mississippi Flyway extended, winter survey, 1960 and 1961

[Comparable coverage]

Species	1960		1961		Percent change	
	Number	Percent	Number	Percent		
Ducks:						
Dabblers:						
Pintail-----	503,733	6.4	543,336	5.9	+8	
Mallard-----	3,017,932	38.2	3,250,623	35.2	+8	
American widgeon-----	336,506	4.2	358,788	3.9	+7	
Shoveler-----	247,797	3.1	303,302	3.3	+22	
Gadwall-----	423,305	5.4	453,101	4.9	+7	
Blue-winged teal-----	268,400	3.4	284,001	3.1	+6	
Green-winged teal-----	449,348	5.7	454,621	4.9	+1	
Black duck-----	170,520	2.1	165,752	1.8	-3	
Wood duck-----	76,027	1.0	95,768	1.0	+26	
Subtotal-----	5,493,568	69.5	5,909,292	64.0	+8	
Divers:						
Scaup-----	981,190	12.4	1,625,578	17.5	+66	
Canvasback-----	33,757	.4	39,682	.4	+18	
Redhead-----	10,293	.1	11,146	.1	+8	
Ring-necked duck-----	43,572	.6	77,461	.8	+78	
Goldeneye-----	35,090	.4	48,420	.5	+38	
Bufflehead-----	3,692	.1	2,326	Trace	-37	
Ruddy duck-----	16,640	.2	21,134	.2	+27	
Subtotal-----	1,124,234	14.2	1,825,747	19.5	+62	
Miscellaneous:						
Scoter and eider-----	323	Trace	8	Trace	--	
Oldsquaw-----	18,223	.2	16,208	.2	-11	
Merganser-----	68,168	.9	63,306	.7	-7	
Subtotal-----	86,714	1.1	79,522	.9	-8	
Total ducks-----	6,704,516	84.8	7,814,561	84.4	+16	
Geese:						
Canada goose-----	261,203	3.3	348,893	3.8	+34	
Snow goose-----	72,995	.9	58,655	.6	-20	
White-fronted goose-----	12,800	.2	24,500	.3	+91	
Blue goose-----	419,906	5.3	470,144	5.1	+12	
Total geese-----	766,904	9.7	902,192	9.8	+18	
Whistling swan-----	272	Trace	¹ 151	Trace	--	
Coot-----	434,884	5.5	524,861	5.7	+21	
All species:						
Total identified-----	7,906,576	100.0	9,241,765	99.9	+17	
Miscellaneous and unidentified-----	² 18,591	--	³ 32,730	--		
Grand total-----	7,925,167	--	9,274,495	--	+17	

¹ Includes 114 mute swans.² Includes 3 American brant.³ Includes 17,200 mottled ducks, in addition to unidentified species.

TABLE C-9.--Distribution of wintering waterfowl, Mississippi Flyway extended, 1956-61
[Index numbers]

Area	1956	1957	1958	1959	1960	1961
Ontario-----	85,157	91,066	62,998	63,501	70,742	55,754
Minnesota-----	5,993	33,754	21,322	13,302	8,418	14,577
Wisconsin-----	70,237	40,541	38,349	37,101	55,722	81,201
Michigan-----	159,701	139,964	106,248	142,209	53,058	50,635
Iowa-----	56,695	110,183	162,258	121,473	47,659	378,755
Missouri-----	465,331	405,082	370,729	357,760	250,769	293,211
Illinois-----	1,538,460	2,117,470	604,561	728,071	663,071	549,605
Indiana-----	1,045,238	518,160	732,720	485,136	355,210	274,093
Ohio-----	141,957	170,476	50,841	56,119	77,775	149,322
Kentucky-----	174,359	197,306	241,003	245,100	95,500	67,200
Arkansas-----	1,350,300	1,231,800	1,674,022	1,443,900	1,336,533	1,282,800
Tennessee-----	302,100	484,439	664,157	585,800	310,203	360,100
Louisiana-----	2,332,660	2,620,500	2,823,395	3,372,000	4,343,000	5,462,000
Mississippi-----	247,173	195,325	161,392	118,600	139,304	125,700
Alabama-----	196,651	145,138	91,589	118,800	118,286	183,000
Total-----	8,172,012	8,501,204	7,805,584	7,888,872	7,925,250	9,327,953
Comparable coverage:						
1956-1957-----	8,172,012	8,496,704	--	--	--	--
1957-1958-----	--	8,499,859	7,720,732	--	--	--
1958-1959-----	--	--	7,805,584	7,883,372	--	--
1959-1960-----	--	--	--	7,886,407	7,882,450	--
1960-1961-----	--	--	--	--	7,925,227	9,274,495

TABLE C-10.--Trend in waterfowl numbers, Mississippi Flyway extended, winter survey, 1949-61

[In thousands]

Year	Ducks	Geese	Coot	Total
1949-----	4,164	680	265	5,109
1950-----	2,842	601	211	3,654
1951-----	5,640	625	251	6,516
1952-----	3,961	559	404	4,924
1953-----	5,240	664	100	6,004
1954-----	5,403	783	123	6,309
1955-----	5,344	680	132	6,156
1956-----	7,460	768	137	8,365
1957-----	7,716	737	187	8,640
1958-----	6,759	750	295	7,804
1959-----	6,890	711	288	7,889
1960-----	6,684	767	434	7,885
1961-----	7,802	902	524	9,228

Note.--Coverage during the period was not comparable and the data were adjusted, using 1959 and 1955 as base years. It was assumed that areas where comparable surveys were conducted provided an accurate measure of the percentage change between 2 consecutive years. On this basis, population estimates were calculated backward and forward from the base years.

TABLE C-11.--Number of birds, by species, Atlantic Flyway extended, winter survey, 1960 and 1961

[Comparable coverage]

Species	1960		1961		Percent change
	Number	Percent	Number	Percent	
Ducks:					
Dabblers:					
Pintail-----	197,453	5.9	215,339	5.7	+9
Mallard-----	225,270	6.7	223,524	5.9	-1
American widgeon-----	98,860	3.0	103,470	2.7	+5
Shoveler-----	19,736	.6	22,700	.6	+15
Gadwall-----	70,618	2.1	38,856	1.0	-45
Blue-winged teal-----	10,012	.3	35,000	.9	--
Green-winged teal-----	73,730	2.2	89,633	2.4	+22
Mottled duck-----	1,730	.1	1,800	Trace	--
Black duck-----	386,710	11.6	331,690	8.8	-14
Wood duck-----	8,662	.3	11,927	.3	+38
Subtotal-----	1,092,781	32.8	1,073,939	28.3	No change
Divers:					
Scaup-----	618,805	18.5	700,176	18.6	+13
Canvasback-----	108,727	3.3	157,806	4.2	+45
Redhead-----	39,180	1.2	89,205	2.4	+128
Ring-necked duck-----	107,936	3.2	97,028	2.6	-10
Goldeneye-----	77,609	2.3	90,065	2.4	+16
Bufflehead-----	22,361	.7	57,069	1.5	+155
Ruddy duck-----	84,213	2.5	55,796	1.5	-34
Subtotal-----	1,058,831	31.7	1,247,145	33.2	+18
Miscellaneous:					
Scoter and eider-----	88,463	2.6	64,282	1.7	-27
Oldsquaw-----	4,252	.1	25,533	.7	--
Merganser-----	62,058	1.9	93,964	2.5	+51
Subtotal-----	154,773	4.6	183,779	4.9	+19
Total ducks-----	2,306,385	69.1	2,504,863	66.4	+9
Geese:					
Canada goose-----	386,397	11.6	544,379	14.4	+41
Snow goose-----	60,774	1.8	67,110	1.8	+10
Blue goose-----	1,300	Trace	804	Trace	--
Total geese-----	448,471	13.4	612,293	16.2	+37
American brant-----	238,416	7.1	265,613	7.0	+11
Whistling swan-----	¹ 42,079	1.2	62,538	1.7	+49
Coot-----	309,257	9.2	325,005	8.7	+5
All species:					
Total identified-----	3,344,608	100.0	3,770,312	100.0	+13
Miscellaneous and unidentified-----	² 35,240	--	35,942	--	--
Grand total-----	3,379,848	--	3,806,254	--	+13

¹ Includes 877 mute swans.² Includes 30 tree ducks.

TABLE C-12.--Distribution of wintering waterfowl, Atlantic Flyway extended 1956-61
[Index numbers]

Area	1956	1957	1958	1959	1960	1961
Newfoundland-----	78,173	22,539	8,706	8,466	7,091	13,797
Quebec-----	1,396	1,725	2,821	952	819	2,018
Maritime Provinces-----	38,090	27,134	22,580	33,288	33,773	21,350
Maine-----	32,588	31,711	17,575	39,909	47,971	40,362
New Hampshire-----	1,508	2,765	3,952	1,178	3,014	3,385
Massachusetts-----	65,340	86,132	91,168	63,844	100,600	83,209
Connecticut-----	54,728	32,746	60,803	46,816	58,805	54,294
Rhode Island-----	26,105	28,273	39,842	27,933	34,594	22,718
New York ¹ -----	241,541	216,041	298,002	208,895	268,026	264,859
New Jersey-----	283,033	404,001	333,901	313,414	389,680	345,556
Pennsylvania-----	33,195	26,271	20,470	19,990	33,719	18,682
Delaware-----	49,837	34,048	26,330	33,102	71,875	101,592
Maryland-----	1,126,381	803,500	434,453	329,600	476,900	637,200
Virginia-----	308,953	172,300	90,393	103,300	162,202	202,900
West Virginia-----	7,841	7,210	6,015	11,834	1,857	2,532
North Carolina-----	477,173	315,200	472,330	334,600	416,100	548,000
South Carolina-----	407,650	483,100	394,030	702,100	678,765	578,600
Georgia-----	11,027	20,500	37,200	81,700	47,152	86,900
Florida-----	1,700,029	1,166,800	872,517	775,900	552,040	782,200
West Indies-----	--	--	--	36,560	--	--
Total-----	4,944,588	3,881,996	3,233,088	3,173,381	3,384,983	3,810,154
Comparable coverage:						
1956-1957-----	4,941,770	3,877,962	--	--	--	--
1957-1958-----	--	3,881,928	3,232,138	--	--	--
1958-1959-----	--	--	3,233,088	3,232,138	--	--
1959-1960-----	--	--	--	3,133,558	3,367,948	--
1960-1961-----	--	--	--	--	3,380,148	3,806,254

¹Vermont included with New York.

TABLE C-13.--Trend in waterfowl numbers, Atlantic Flyway extended, winter survey, 1949-61

[In thousands]

Year	Ducks	Geese	Brant	Swan	Coot	Total
1949-----	2,685	365	75	42	863	4,030
1950-----	2,757	349	77	31	661	3,875
1951-----	3,314	334	114	34	560	4,356
1952-----	3,904	344	104	36	540	4,928
1953-----	4,670	552	155	56	1,403	6,836
1954-----	3,879	396	245	53	352	4,925
1955-----	4,344	567	184	90	616	5,801
1956-----	3,892	549	164	39	852	5,496
1957-----	2,862	403	162	40	649	4,116
1958-----	2,271	366	211	28	394	3,270
1959-----	2,278	339	217	28	311	3,173
1960-----	2,365	449	238	41	315	3,408
1961-----	2,566	613	265	61	331	3,836

Note.--Coverage during the period was not comparable and the data were adjusted, using 1959 and 1955 as base years. It was assumed that areas where comparable surveys were conducted provided an accurate measure of the percentage change between 2 consecutive years. On this basis, population estimates were calculated backward and forward from the base years.

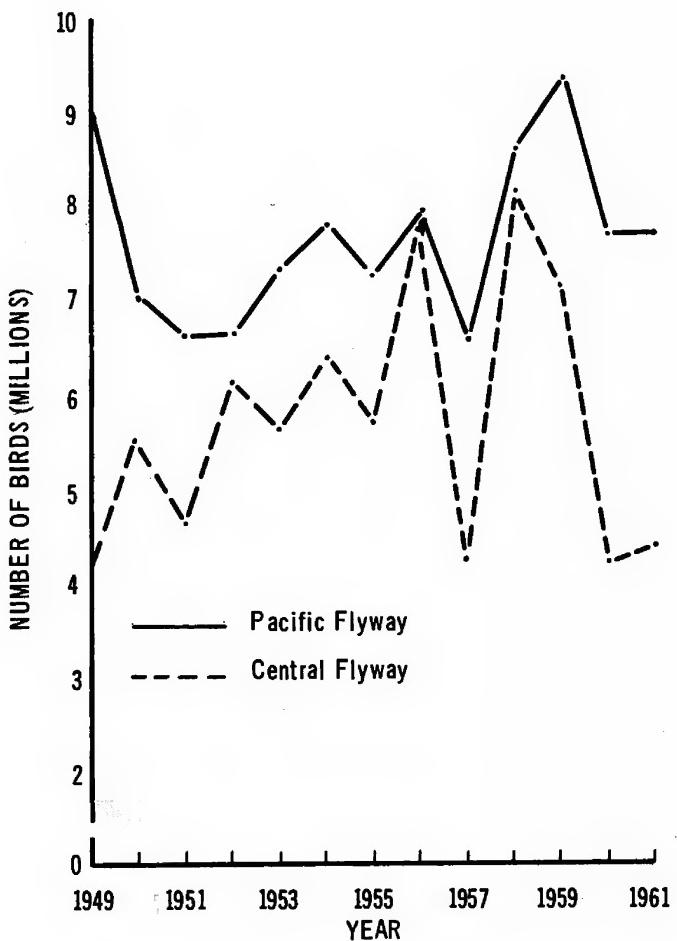
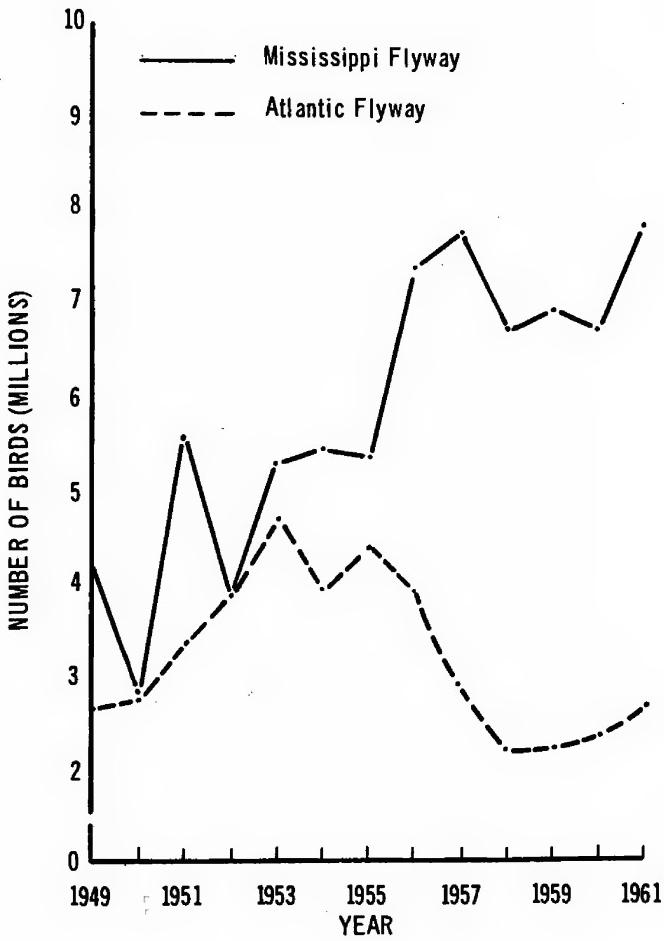


FIGURE C-1.--Trends in numbers of wintering ducks, by Flyways, 1949-61.



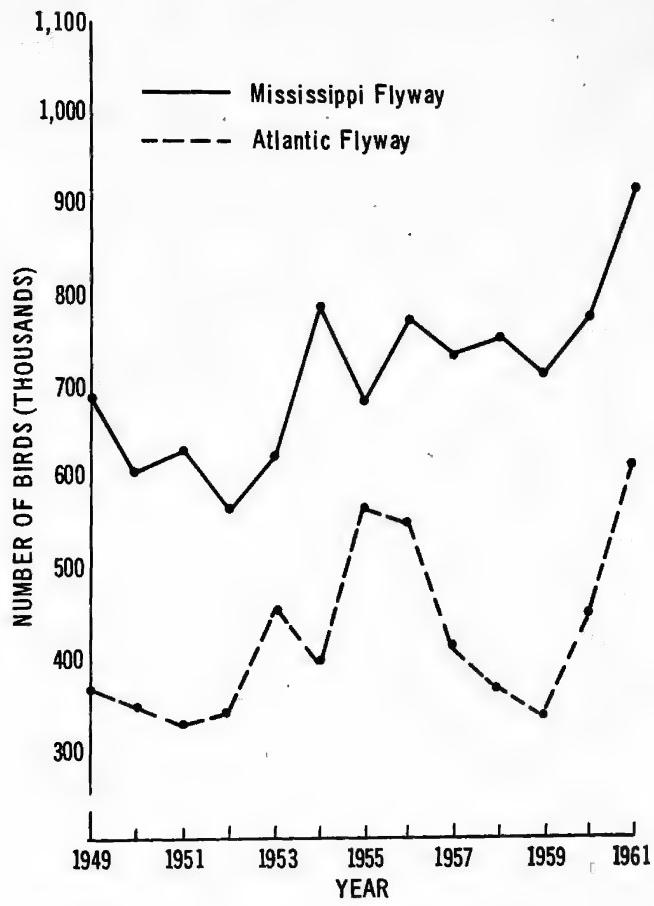
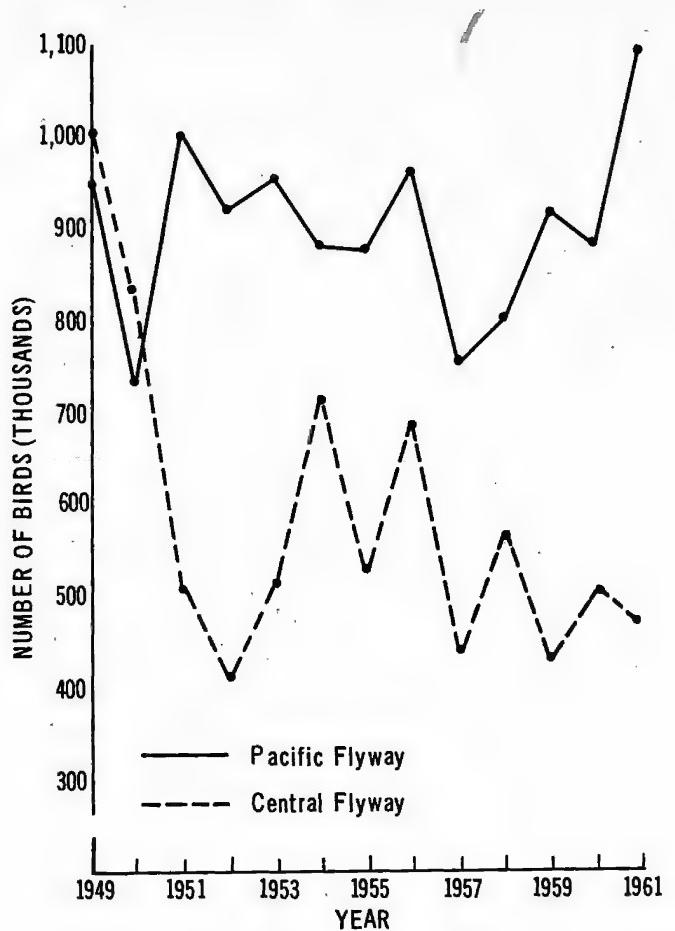


FIGURE C-2---Trend in numbers of wintering geese, by Flyways, 1949-61.

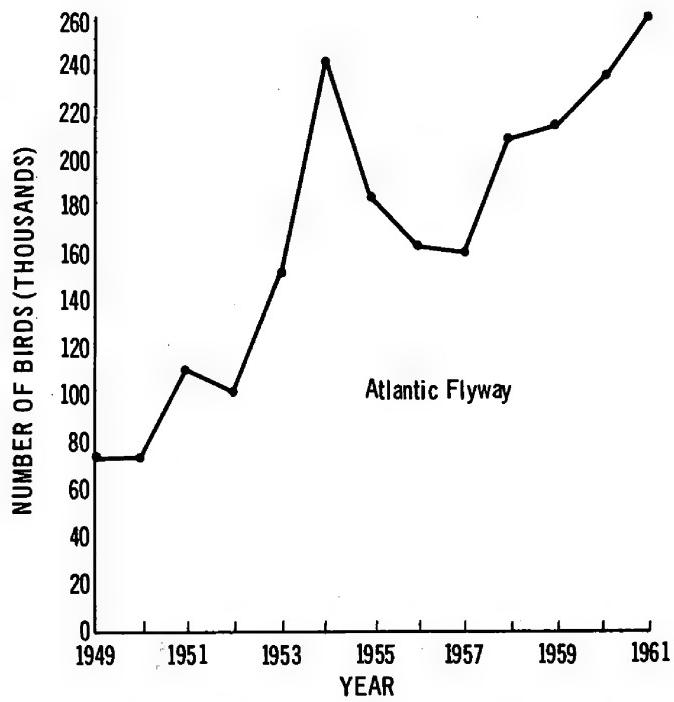
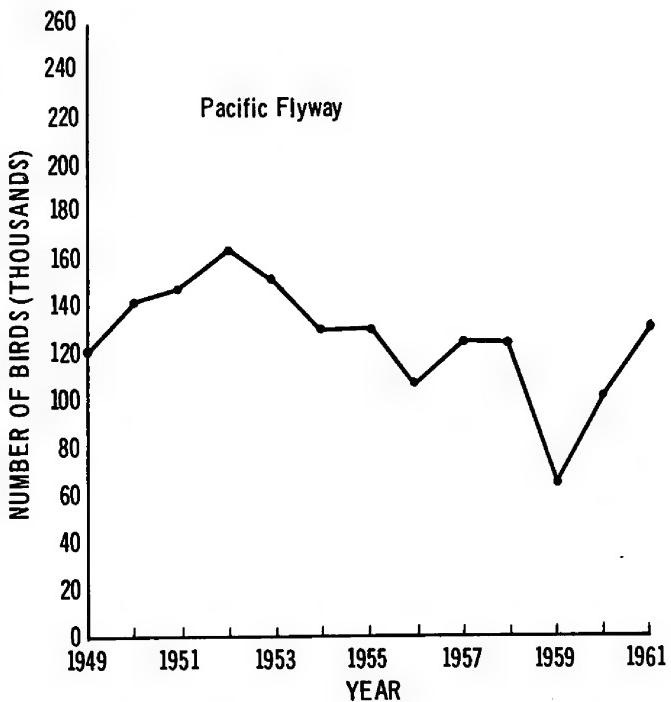


FIGURE C-3---Trend in numbers of wintering brant, by Flyways, 1949-61.

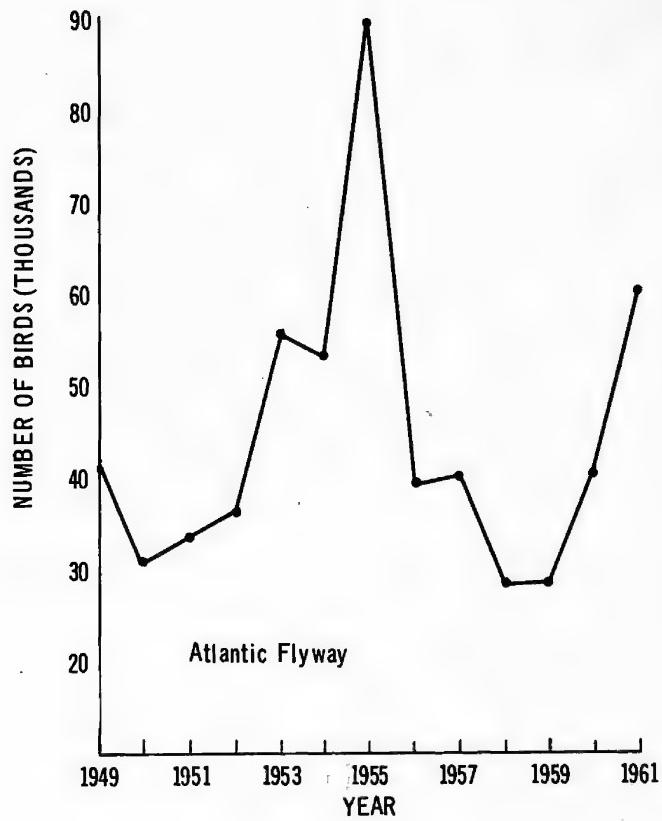
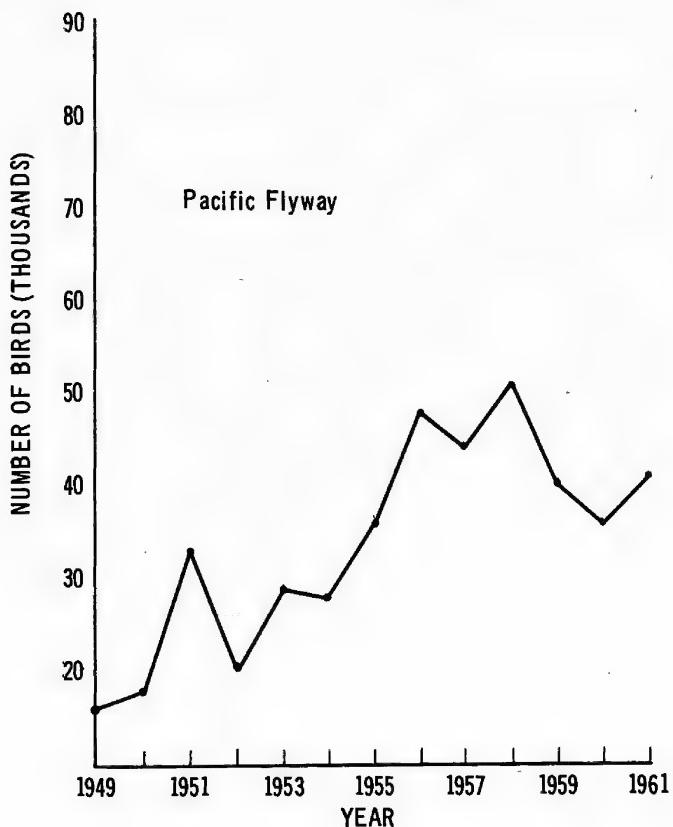


FIGURE C-4---Trend in numbers of wintering swan, by Flyways, 1949-61.

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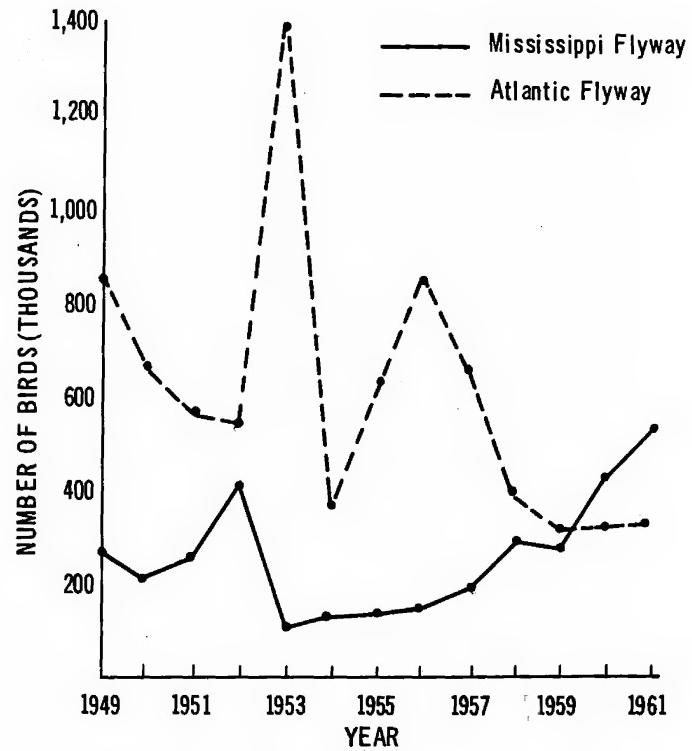
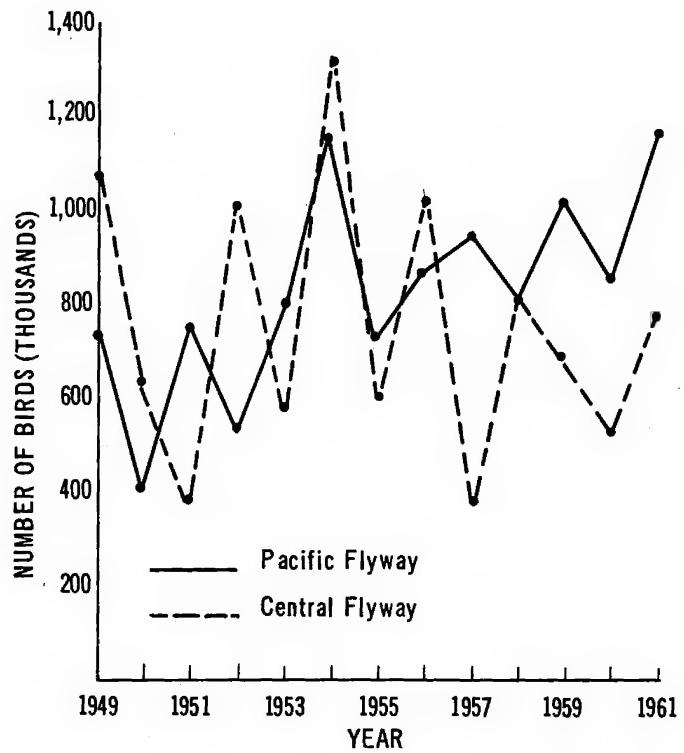


FIGURE C-5.--Trend in numbers of wintering coot, by Flyways, 1949-61.

D. WATER AREA SURVEY TABLES

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TABLE D-1.--Estimated number of water areas, southern Alberta, 1952-61
 [Index numbers, in thousands]

Year	Stratum			Total
	A	B	C	
May:				
1952-----	402	566	135	1,103
1953-----	369	539	144	1,052
1954-----	434	607	122	1,163
1955-----	405	656	191	1,252
1956-----	353	598	116	1,067
1957-----	187	442	82	706
1958-----	255	431	120	806
1959-----	131	253	120	504
1960-----	257	550	193	1,000
1961-----	191	432	69	692
Average, 1952-60-----	310	515	136	961
Percent change, 1961 from--				
Average-----	-38	-16	-49	-28
1960-----	-26	-21	-64	-31
July:				
1952-----	308	396	114	818
1953-----	408	363	150	921
1954-----	241	400	65	706
1955-----	218	339	66	623
1956-----	185	420	64	669
1957-----	120	288	42	450
1958-----	136	282	53	471
1959-----	93	140	74	307
1960-----	84	263	57	403
1961-----	51	153	35	239
Average, 1952-60-----	199	321	76	596
Percent change, 1961 from--				
Average-----	-74	-52	-54	-60
1960-----	-39	-42	-39	-41

TABLE D-2.--Number of water areas, by stratum, southern Saskatchewan, May and July, 1960 and 1961
 [Index numbers, in thousands]

Month and year	Stratum					Total
	A-East	A-West	B-East	B-West	C	
May:						
Average, 1952-60-----	--	--	--	--	--	
1960-----	479	377	988	164	90	2,534
1961-----	49	171	221	92	56	2,098
Percent change, 1961 from--						589
Average-----	--	--	--	--	--	-77
1960-----	-90	-55	-78	-44	-38	-72
July:						
Average, 1952-60-----	--	--	--	--	--	
1960-----	212	265	318	88	33	1,681
1961-----	34	51	61	37	10	916
Percent change, 1961 from--						193
Average-----	--	--	--	--	--	-89
1960-----	-84	-81	-81	-58	-70	-79

TABLE D-3.--Number of water areas, by years, southern Saskatchewan, 1952-61
 [Index numbers, in thousands]

Year	May	July	Year	May	July
1952-----	2,306	855	1957-----	1,445	1,254
1953-----	3,727	2,551	1958-----	1,663	765
1954-----	4,264	3,037	1959-----	783	428
1955-----	4,033	3,794	1960-----	2,098	916
1956-----	2,489	1,753	1961-----	589	193

TABLE D-4.--Number of water area per square mile, Montana, 1959-61

	Sheridan County	Hi-Line		Great Falls- Piedmont	Total
		Eastern	Central		
Reservoirs:					
1959-----	0.43	0.64	1.10	1.22	0.95
1960-----	.35	.51	.91	1.79	1.00
1961-----	.27	.55	1.09	.83	.81
Potholes:					
1959-----	2.64	.34	2.21	1.44	1.45
1960-----	9.09	1.10	3.19	1.14	2.32
1961-----	4.40	.43	.22	.52	.60
Other water areas:					
1959-----	.43	.88	.73	1.04	.84
1960-----	.59	1.18	.84	1.05	.99
1961-----	.40	.98	.51	.96	.77
Total:					
1959-----	3.50	1.86	4.04	3.69	3.25
1960-----	10.03	2.79	4.94	3.98	4.30
1961-----	5.07	1.96	1.83	2.31	2.18
Percent change, 1961 from 1960--	-50	-30	-63	-42	-49

TABLE D-5.--Number of water areas, by stratum, North Dakota, South Dakota, and western Minnesota, 1958-61

[Index numbers, in thousands]

	Stratum			Total
	East	Central	West	
May:				
1958-----	406	320	119	845
1959-----	162	109	69	340
1960-----	223	397	75	695
1961-----	151	105	51	307
Percent change, 1961 from 1960--	-32	-73	-33	-56
July:				
1958-----	470	293	254	1,017
1959-----	213	110	73	396
1960-----	309	311	116	736
1961-----	166	108	77	351
Percent change, 1961 from 1960--	-46	-65	-33	-52

TABLE D-6.--Water indexes, North Dakota,
May 1948-61

Year	Index number
Average, 1948-60-----	376,600
1960-----	383,700
1961-----	168,300
Percent change, 1961 from--	
Average-----	-55
1960-----	-56

TABLE D-7.--Number of water areas, South Dakota, 1950-61

[Index numbers]

	Index	Number per square mile
May:		
1961:		
Stratum 1-----	45,800	2.13
Stratum 2-----	49,500	1.93
Stratum 3-----	32,600	1.23
Total-----	127,900	1.74
1960-----	274,800	3.73
Average, 1950-60-----	309,400	4.20
Percent change, 1961 from--		
1960-----	-53	--
Average-----	-59	--
July:		
1961:		
Stratum 1-----	51,400	2.39
Stratum 2-----	62,300	2.44
Stratum 3-----	54,600	2.05
Total-----	168,300	2.29
1960-----	306,500	4.16
Average, 1953-60-----	229,100	3.11
Percent change, 1961 from--		
1960-----	-45	--
Average-----	-27	--

TABLE D-8.--Number of water areas, by stratum, southern Manitoba, May and July, 1951-61

[Index numbers, in thousands]

Year	Stratum A	Stratum B	Total
May:			
1951-----	240	186	426
1952-----	174	155	329
1953-----	187	312	499
1954-----	258	1,075	1,333
1955-----	315	428	743
1956-----	391	615	1,006
1957-----	262	404	666
1958-----	352	264	616
1959-----	160	482	642
1960-----	324	295	619
1961-----	158	263	421
Average, 1951-60-----	266	422	688
Percent change, 1961 from--			
1960-----	-51	-11	-32
Average-----	-41	-38	-39
July:			
1954-----	472	384	856
1955-----	339	271	610
1956-----	426	412	838
1957-----	242	260	502
1958-----	163	341	504
1959-----	96	324	420
1960-----	164	212	376
1961-----	41	88	129
Average, 1954-60-----	272	315	587
Percent change, 1961 from--			
1960-----	-75	-58	-66
Average-----	-85	-72	-78

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E. BREEDING POPULATION SURVEY TABLES

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TABLE E-1.--Statistical summary: Alaska waterfowl breeding population survey, 1960 and 1961

	Stratum				Total
	II	III	IV	V	
Area (sq. mi.)-----	15,150	42,350	17,000	1,950	76,450
Sample (sq. mi.):					
1960-----	152	388	180	72	792
1961-----	104	368	184	52	708
Population index:					
Ducks per square mile:					
1960-----	5.7	20.6	29.7	52.5	20.5
1961-----	11.3	19.4	37.9	63.4	23.1
Total ducks:					
1960-----	86,920	872,910	504,820	102,440	1,567,090
1961-----	171,500	823,000	644,900	123,600	1,763,000
Game ducks: ¹					
1960-----	72,840	584,380	378,740	100,540	1,136,500
1961-----	144,890	572,550	495,280	122,500	1,335,220

¹ Excluding scoter, eider, and oldsquaw.

TABLE E-2.--Whistling swan and little brown crane breeding population indexes, Alaska, 1956-61

	1956	1957	1958	1959	1960	1961
Area sampled (sq. mi.)-----	472	612	640	644	604	648
Whistling swan:						
Number counted-----	642	859	600	546	710	759
Birds per square mile-----	1,360	1,403	0.938	0.848	1.175	1.171
Population index-----	68,325	95,330	63,735	58,640	79,310	79,040
Little brown crane:						
Number counted-----	--	254	235	268	209	285
Birds per square mile-----	--	0.415	0.367	0.416	0.264	0.441
Population index-----	--	31,725	24,935	31,800	20,185	30,495

TABLE E-3.--Waterfowl breeding population indexes, by species and stratum, Alaska, 1960 and 1961

Species	Stratum II		Stratum III		Stratum IV	
	1960	1961	1960	1961	1960	1961
Dabblers:						
Pintail-----	23,380	38,250	192,660	219,900	123,180	153,500
Mallard-----	5,040	13,750	46,200	39,600	13,630	34,180
American widgeon-----	700	1,890	13,950	13,200	8,080	22,550
Shoveler-----	1,390	2,920	3,400	4,150	500	6,450
Green-winged teal-----	1,390	--	--	2,500	--	650
Subtotal-----	31,900	56,810	256,210	279,350	145,390	217,330
Divers:						
Scaup-----	29,640	64,850	312,100	280,800	208,500	263,750
Canvasback-----	--	--	870	850	12,100	650
Goldeneye-----	7,130	13,720	8,700	4,950	4,750	6,450
Bufflehead-----	4,170	5,730	6,500	6,660	8,000	7,100
Subtotal-----	40,940	84,300	328,170	293,260	233,350	277,950
Miscellaneous:						
Scooter-----	14,080	28,500	231,000	202,600	76,730	82,550
Eider-----	--	--	4,350	1,650	13,000	28,370
Oldsquaw-----	--	1,890	53,180	46,200	36,350	38,700
Subtotal-----	14,080	30,390	288,530	250,450	126,080	149,620
Total-----	86,920	171,500	872,910	823,060	504,820	644,900

Species	Stratum V		Total		Percent change
	1960	1961	1960	1961	
Dabblers:					
Pintail-----	16,400	28,300	355,620	439,950	+23
Mallard-----	13,100	20,270	77,970	107,800	+38
American widgeon-----	3,100	3,830	25,830	41,470	+60
Shoveler-----	2,100	2,970	7,390	16,490	+123
Green-winged teal-----	--	1,240	1,390	4,390	+215
Subtotal-----	34,700	56,610	468,200	610,100	+30
Divers:					
Scaup-----	46,940	47,700	597,180	657,100	+10
Canvasback-----	6,150	4,820	19,120	6,320	-68
Goldeneye-----	6,800	870	27,380	25,990	-5
Bufflehead-----	4,950	11,500	23,620	30,990	+31
Subtotal-----	64,840	64,890	667,300	720,400	+8
Miscellaneous:					
Scooter-----	1,900	2,100	323,710	315,750	-2
Eider-----	--	--	17,350	30,020	+73
Oldsquaw-----	--	--	89,530	86,790	-3
Subtotal-----	1,900	2,100	430,590	432,560	No change
Total-----	101,440	123,600	1,566,090	1,763,060	+12

TABLE E-4.--Waterfowl breeding population indexes in northern Alberta, northeastern British Columbia, Northwest Territories, and Yukon, 1960 and 1961

Species	Stratum						
	1-1	1-2	2	3	4	5	6
Ducks:							
Dabblers:							
Pintail	66,500	26,400	74,400	62,600	29,800	112,500	6,000
Mallard	399,200	225,300	91,400	129,100	21,500	119,700	28,200
American widgeon	93,100	65,000	7,700	53,500	6,900	37,500	14,800
Showeler	39,900	48,700	8,500	16,200	—	40,100	900
Gadwall	4,000	—	500	—	—	—	—
Blue-winged teal	53,200	32,500	1,500	3,000	—	—	—
Green-winged teal	20,100	46,200	4,000	37,300	4,500	21,400	13,200
Subtotal	676,000	456,100	188,000	291,700	62,700	331,200	63,100
Divers:							
Spoon	252,800	205,300	10,300	451,200	112,800	30,800	106,800
Cinnamon	13,300	—	12,000	—	—	—	—
Redhead	17,300	3,300	7,200	—	—	4,100	—
Ring-necked duck	45,200	2,400	1,000	3,000	1,400	1,100	4,800
Goldeneye	79,800	12,200	25,500	17,200	4,500	—	1,100
Bufflehead	66,500	48,700	4,000	9,100	3,000	6,800	3,700
Busty duck	6,700	2,400	300	—	—	1,100	—
Subtotal	481,600	274,300	60,300	480,500	121,700	43,900	116,400
Miscellaneous:							
Scooter and eider	133,100	59,200	1,800	202,900	78,400	—	5,400
Oldsquaw	—	2,200	—	6,100	54,500	—	500
Merganser	39,900	19,500	300	28,200	29,800	—	—
Subtotal	173,000	80,900	2,100	237,200	162,700	—	5,900
Total ducks	1,294,600	811,300	250,400	1,009,400	347,100	375,100	185,400
Coot	12,100	8,400	3,200	—	—	1,300	—
Geese:							
Canada	13,700	2,800	900	13,400	5,700	—	—
White-fronted	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—

Species	Stratum					Total	Percent change
	7	8	9	10	1961		
Ducks:							
Dabblers:							
Pintail	73,700	43,500	8,300	16,300	522,000	352,980	+48
Mallard	45,300	24,600	2,500	3,600	1,090,400	417,800	+161
American widgeon	42,100	12,900	3,200	9,100	345,800	329,400	+45
Showeler	—	1,800	600	200	156,900	77,320	+103
Gadwall	—	—	—	—	4,500	1,880	+139
Blue-winged teal	—	—	—	—	90,200	65,450	+38
Green-winged teal	2,100	1,800	—	1,500	152,100	144,040	+6
Subtotal	163,200	84,600	14,600	30,700	2,361,900	1,388,870	+70
Divers:							
Spoon	360,200	51,000	52,600	48,500	1,682,300	1,448,190	+16
Cinnamon	—	2,100	—	700	28,100	52,330	-46
Redhead	—	—	—	—	31,900	29,420	+8
Ring-necked duck	1,100	—	—	—	60,000	76,410	-22
Goldeneye	11,600	3,800	—	2,100	157,800	50,210	+214
Bufflehead	—	—	—	—	141,800	159,330	-11
Busty duck	—	—	—	—	10,500	8,650	+21
Subtotal	372,900	56,900	52,600	51,300	2,112,400	1,824,540	+16
Miscellaneous:							
Scooter and eider	402,300	34,300	75,000	74,200	1,065,600	1,266,540	-16
Oldsquaw	100,000	—	42,300	6,700	211,800	187,800	+13
Merganser	15,800	3,800	4,500	300	142,100	130,170	+9
Subtotal	527,100	38,100	121,300	81,200	1,419,500	1,584,510	-10
Total ducks	1,053,200	179,600	186,500	163,200	5,893,800	4,797,920	
Coot	—	—	—	—	25,000	24,300	+3
Geese:							
Canada	2,300	300	600	—	39,700	45,300	-12
White-fronted	—	—	6,700	—	8,700	7,200	+21
Subtotal	11,400	3,800	14,100	300	29,600	23,600	+25

TABLE E-5.--Waterfowl breeding population indexes in northern Alberta, northeastern British Columbia, Northwest Territories, and Yukon, 1954-61

Species	1954	1955	1956	1957	1958	1959	1960	1961
Ducks:								
Dabblers:								
Pintail-----	469,000	99,400	277,700	302,300	453,200	1,002,500	352,980	522,000
Mallard-----	617,900	276,200	466,000	498,400	776,900	1,254,700	417,800	1,090,400
American widgeon-----	344,500	213,600	301,100	261,500	205,000	426,700	329,400	345,800
Shoveler-----	62,700	20,400	41,800	42,700	100,300	187,600	77,320	156,900
Gadwall-----	5,400	2,000	--	2,600	1,700	2,700	1,880	4,500
Blue-winged teal-----	6,500	10,400	9,000	6,200	47,700	105,300	65,450	90,200
Green-winged teal-----	143,000	74,200	107,600	70,400	122,200	281,100	144,040	152,100
Subtotal-----	1,649,000	696,200	1,203,200	1,184,100	1,707,000	3,260,600	1,388,870	2,361,900
Divers:								
Scaup-----	2,618,700	1,084,100	1,219,100	1,120,300	1,304,800	2,055,800	1,448,190	1,682,300
Canvasback-----	87,400	28,000	20,800	18,500	80,900	60,900	52,330	28,100
Redhead-----	24,200	27,100	22,000	25,000	13,900	77,800	29,420	31,900
Ring-necked duck-----	56,700	16,900	54,800	40,400	42,400	130,700	76,410	60,000
Goldeneye-----	56,800	81,900	32,900	57,300	233,900	245,400	50,210	157,800
Bufflehead-----	274,900	151,800	120,700	92,500	120,700	206,000	159,330	141,800
Ruddy duck-----	2,900	1,900	--	6,200	12,700	27,100	8,650	10,500
Subtotal-----	3,121,600	1,391,700	1,470,300	1,360,200	1,809,300	2,803,700	1,824,540	2,112,400
Miscellaneous:								
Scoter-----	?	665,600	812,200	859,400	752,000	1,299,700	1,266,540	1,065,600
Oldsquaw-----	?	100,700	130,100	105,400	207,300	284,800	187,800	211,800
Merganser-----	?	87,800	169,700	179,600	155,400	145,900	130,170	142,100
Subtotal-----	?	854,100	1,112,000	1,144,400	1,114,700	1,730,400	1,584,510	1,419,500
Total ducks-----	4,770,600	2,087,900	3,785,500	3,688,700	4,631,000	7,794,700	4,797,920	5,893,800
Coot-----	?	?	?	?	?	?	24,300	25,000
Geese:								
Canada-----	?	?	63,300	21,000	52,400	93,300	45,300	39,700
White-fronted-----	?	?	7,800	7,800	800	10,000	7,200	8,700
Swan-----	?	?	15,050	11,400	13,300	45,400	23,600	29,600

TABLE E-6.--Waterfowl breeding population indices, by species, southern Alberta, 1960 and 1961
 [Index numbers, in thousands]

Species	Stratum A			Stratum B			Stratum C			Total		
	1960	1961	Percent change	1960	1961	Percent change	1960	1961	Percent change	1960	1961	Percent change
Ducks:												
Dabblers:												
Pintail-----	324	115	-65	156	132	-15	140	36	-74	620	283	-54
Mallard-----	269	206	+23	602	581	-3	126	60	-52	997	847	-15
American widgeon-----	84	46	-45	114	128	+12	23	12	-48	221	186	-16
Shoveller-----	100	47	-53	112	109	-3	26	11	-58	238	167	-30
Gadwall-----	39	21	-46	89	84	-6	13	3	-77	141	108	-23
Blue-winged teal-----	45	35	-22	111	125	+13	9	10	+11	165	170	+3
Green-winged teal-----	12	17	+42	42	44	+5	Trace	3	--	54	64	+19
Cinnamon teal-----	---	--	--	--	--	--	Trace	Trace	Trace	Trace	Trace	Trace
Subtotal-----	873	487	-44	1,226	1,213	-2	337	135	-60	2,436	1,825	-25
Divers:												
Scaup-----	68	45	-34	157	169	+8	24	34	+42	249	248	0
Canvasback-----	3	5	+67	35	32	-9	2	--	-100	40	37	-7
Redhead-----	9	6	-33	26	31	+19	4	3	-25	39	40	+3
Ring-necked duck-----	Trace	Trace	Trace	1	1	0	--	--	--	1	1	0
Goldeneye-----	1	1	0	2	2	0	Trace	--	--	3	3	0
Bufflehead-----	1	1	0	20	30	+50	1	1	0	22	32	+45
Ruddy duck-----	3	1	-67	23	14	-39	6	3	-50	32	18	-44
Subtotal-----	85	59	-31	264	279	+6	37	41	+11	386	379	-2
Miscellaneous:												
Scooter-----	1	1	0	34	43	+26	--	Trace	--	35	44	+26
Total ducks-----	959	549	-43	1,524	1,525	0	374	176	-53	2,857	2,248	-21
Coot-----	22	23	+5	35	60	+72	31	14	-55	88	97	+10

TABLE E-7.--Trend in waterfowl breeding populations by species, southern Alberta, 1952-61

[Index numbers, in thousands]

Species	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
Ducks:										
Dabblers:										
Pintail-----	863	781	677	784	707	595	651	568	620	284
Mallard-----	638	837	879	970	903	1,038	1,194	1,295	997	848
American widgeon-----	118	180	177	177	157	157	179	254	221	187
Shoveller-----	106	156	174	172	171	155	217	204	238	167
Gadwall-----	--	20	60	62	85	61	79	127	140	109
Blue-winged teal-----	74	66	174	217	134	134	174	189	165	169
Green-winged teal-----	--	10	63	55	27	31	34	72	55	64
Cinnamon teal-----	--	2	Trace	--	--	--	Trace	1	Trace	Trace
Subtotal-----	¹ 1,934	2,052	2,204	2,437	2,184	2,171	2,528	2,710	2,436	1,828
Divers:										
Scaup-----	135	129	199	249	267	327	309	326	249	249
Canvasback-----	--	35	52	48	53	54	94	52	40	37
Redhead-----	--	42	48	60	59	45	63	57	40	40
Ring-necked duck-----	--	--	--	Trace	4	--	1	4	2	2
Goldeneye-----	--	1	4	5	6	5	3	3	3	3
Bufflehead-----	--	9	13	13	16	17	21	27	22	32
Ruddy duck-----	--	13	13	21	20	12	16	33	32	19
Subtotal-----	¹ 135	229	329	396	425	460	507	502	388	382
Miscellaneous:										
Scooter-----	--	--	--	--	41	26	32	56	35	43
Total ducks-----	¹ 2,069	² 2,281	² 2,533	² 2,833	2,650	2,657	3,067	3,268	2,859	2,253
Coot-----	--	92	168	100	81	44	74	131	88	97

¹ Incomplete data (minor species not included).² Scooter not included.

TABLE E-8.--Aerial counts of Canada goose breeding pairs and grouped birds, Idaho, 1955-61

Area	1955	1956	1957	1958	1959	1960	1961
Snake River drainage:							
Farewell Bend to railroad bridge-----	1,168	781	1,196	1,184	1,146	1,322	1,223
Payette River (mouth to Emmett)-----	261	239	341	345	284	430	308
Strike Dam to American Falls Dam-----	267	209	130	245	148	126	199
North Fork, including Island Park-----	221	217	280	348	371	404	473
South Fork-----	132	101	116	143	176	204	222
Mud Lake - Camas Refuge area-----	220	235	213	285	298	257	313
Gray's Lake area-----	291	282	446	426	401	561	596
Blackfoot Reservoir area-----	306	446	411	507	444	512	580
Subtotal-----	2,866	2,510	3,133	3,483	3,268	3,816	3,914
Bear River and drainage:							
Dingle Marsh area-----	474	477	714	1,054	1,150	903	1,418
Total-----	3,340	2,987	3,847	4,537	4,418	4,719	5,332

TABLE E-9.--Trend in number of young produced on Canada goose nesting units, Idaho, 1954-61

Nesting unit	1954	1955	1956	1957	1958	1959	1960	1961	Percent change from 1960
Southwestern Idaho:									
Glenns Ferry-----	41	4	36	41	44	29	15	15	No change
Homedale-----	930	601	627	1,030	798	541	863	769	-11
Payette River-----	--	--	--	--	--	325	522	383	-27
Southeastern Idaho:									
Blackfoot Reservoir-----	351	387	323	201	267	274	313	250	-20
Island Park Reservoir-----	148	52	185	95	121	179	206	130	-37
North Fork Snake River-----	154	94	152	136	145	213	148	124	-16
North Lake-----	80	130	173	118	121	115	136	132	-3
Total-----	1,704	1,268	1,496	1,621	1,496	1,676	2,203	1,803	-18

TABLE E-10.--Waterfowl nesting-pair count on key production areas, Nevada, 1959-61

Species	West-central Nevada			Northeastern Nevada			Total		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
Ducks:									
Dabblers:									
Pintail-----	280	73	49	56	158	243	336	231	292
Mallard-----	750	224	245	750	719	668	1,500	963	913
Shoveler-----	59	27	15	25	138	86	84	165	101
Gadwall-----	719	202	202	296	178	196	1,015	380	398
Cinnamon teal-----	1,644	211	235	326	274	187	1,970	485	422
Subtotal-----	3,452	737	746	1,453	1,467	1,380	4,905	2,224	2,126
Divers:									
Canvasback-----	--	--	--	100	275	204	100	275	204
Redhead-----	2,090	397	210	652	545	402	2,742	942	612
Ruddy duck-----	224	154	78	206	50	30	430	204	108
Subtotal-----	2,314	551	288	958	870	636	3,272	1,421	924
Other ducks-----	14	5	0	38	173	117	52	178	117
Total ducks-----	5,780	1,293	1,034	2,449	2,510	2,133	8,229	3,823	3,167
Canada goose-----	272	232	231	124	186	132	396	418	363

TABLE E-11.--Trend in duck numbers, Utah, 1957-61

	Route flown						
	Box Elder County	Weber County	Davis County	Jordan River Clubs	Salt Lake County	Utah County	Total
Area sampled (sq. mi.)-----	48.0	15.5	14.2	6.2	6.7	18.0	108.6
Ducks:							
Number counted:							
1957-----	962	416	313	402	64	113	2,270
1958-----	2,070	483	342	400	76	284	3,655
1959-----	1,671	573	466	488	55	231	3,484
1960-----	2,458	766	791	646	76	515	5,252
1961-----	2,119	732	478	320	29	864	4,542
Number per square mile:							
1957-----	20.0	26.8	22.0	64.8	9.6	6.3	20.9
1958-----	43.1	31.8	24.1	64.5	11.3	15.7	33.7
1959-----	34.8	37.0	32.8	78.7	8.2	12.8	32.1
1960-----	51.2	49.4	55.7	104.2	11.3	28.6	48.0
1961-----	44.1	47.2	33.7	51.6	4.3	48.0	41.8
Percent change, 1961 from 1960-----	-14	-4	-40	-50	-62	+68	-14

TABLE E-12.--Trends in dike line breeding pair counts of waterfowl on four State refuges, Utah, 1957-1961

Species	1957	1958	1959	1960	1961
Ducks:					
Dabblers:					
Shoveler-----	189	294	289	428	314
Mallard-----	564	739	696	910	853
Gadwall-----	278	331	316	407	426
Pintail-----	183	527	459	516	453
Cinnamon teal-----	585	540	607	830	700
Blue-winged teal-----	52	78	95	119	52
Green-winged teal-----	33	23	32	13	70
American widgeon-----	3	5	12	2	16
Subtotal-----	1,887	2,537	2,506	3,225	2,886
Divers:					
Redhead-----	777	930	1,056	1,283	1,183
Canvasback-----	--	--	1	--	--
Scaup-----	4	3	9	2	20
Goldeneye-----	1	--	--	--	--
Bufflehead-----	--	1	4	--	--
Subtotal-----	782	934	1,070	1,285	1,203
Miscellaneous:					
Ruddy duck-----	200	192	272	329	290
Total ducks-----	2,869	3,663	3,848	4,839	4,379
Canada goose-----	132	157	147	152	161

TABLE E-13.--Trend in indicated numbers of breeding ducks on selected areas in south central Utah, 1957-61

Area	1957	1958	1959	1960	1961
Clear Lake Refuge-----	662	1,834	1,698	1,544	2,068
Lower Sevier Lake ¹ -----	136	134	280	154	204
Gumison Reservoir-----	28	70	46	10	46
Scipio Lake-----	70	170	230	196	816
Fool's Creek Reservoir-----	14	20	8	14	Dry
Redmond Lake ² -----	50	76	90	60	86
Olsen's Slough-----	--	134	246	120	114
Rocky Ford Reservoir-----	28	10	32	0	10
Topaz Marsh-----	44	120	112	40	Dry
Total-----	1,032	2,568	2,742	2,138	3,344

¹ All lakes except Swan Lake dry in 1960-1961.² Census figures for Olsen's Slough and Redmond Lake are combined in 1957 listings.

TABLE E-14.--Trend in waterfowl breeding populations, by species, southern Saskatchewan, May 1952-61

[Index numbers, in thousands]

Species	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
Ducks:										
Dabblers:										
Pintail-----	1,374	1,335	1,275	1,774	1,970	1,185	789	384	600	258
Mallard-----	1,536	1,958	1,912	2,032	2,473	2,274	3,165	1,856	1,656	1,141
American widgeon-----	265	185	182	236	301	204	276	182	143	93
Shoveler-----	340	255	289	352	390	309	213	167	303	116
Gadwall-----	109	77	85	108	111	125	54	72	71	36
Blue-winged teal-----	265	133	264	376	384	310	207	153	134	102
Green-winged teal-----	26	21	19	52	62	33	24	18	30	12
Subtotal-----	3,917	3,964	4,026	4,930	5,691	4,440	4,728	2,832	2,937	1,758
Divers:										
Scap-----	230	209	210	460	552	455	214	162	157	159
Canvasback-----	163	253	167	178	223	215	158	64	63	69
Redhead-----	37	85	73	85	153	112	59	41	47	26
Ring-necked duck-----	3	1	6	20	9	4	6	31	7	4
Goldeneye-----	13	1	8	5	16	8	5	4	6	3
Bufflehead-----	6	8	4	9	7	16	6	12	10	13
Ruddy duck-----	37	18	15	48	47	34	12	18	14	1
Subtotal-----	489	575	483	805	1,007	844	460	332	304	375
Miscellaneous:										
Scoter-----	42	47	75	9	16	1	5	7	6	4
Other-----	--	--	--	--	--	2	--	1	7	1
Subtotal-----	42	47	75	9	16	3	5	8	13	5
Total ducks-----	4,448	4,586	4,584	5,744	6,714	5,287	5,193	3,172	3,254	2,038
Coot-----	70	152	140	202	306	242	74	82	66	31

TABLE E-15.--Waterfowl breeding populations, by species and stratum, southern Saskatchewan, May 1960 and 1961

[Index numbers, in thousands]

Species	Stratum					Total		Average 1949-60	Percent change from--	
	A-East	A-West	B-East	B-West	C	1961	1960		1960	Average
Ducks:										
Dabblers:										
Pintail-----	18	96	74	40	30	258	600	1,067	-57	-76
Mallard-----	163	316	432	188	42	1,141	1,656	1,758	-31	-35
American widgeon-----	15	27	24	19	8	93	143	200	-35	-54
Shoveler-----	15	48	30	16	7	116	303	263	-62	-56
Gadwall-----	6	10	8	8	4	36	71	85	-49	-27
Blue-winged teal-----	56	13	22	9	2	102	134	218	-24	-53
Green-winged teal-----	4	4	--	4	Trace	12	30	30	-60	-60
Subtotal-----	277	514	590	284	93	1,758	2,937	3,621	-40	-52
Divers:										
Scaup-----	24	30	49	49	7	159	157	244	+1	-35
Canvasback-----	12	6	24	22	5	69	63	140	+10	-51
Redhead-----	3	4	8	10	1	26	47	64	-45	-59
Ring-necked duck-----	2	2	--	Trace	Trace	4	7	8	-43	-50
Goldeneye-----	--	--	2	1	--	3	6	8	-50	-62
Bufflehead-----	2	1	6	4	--	13	10	10	+30	+30
Ruddy duck-----	1	--	--	--	--	1	14	24	-93	-96
Subtotal-----	44	43	89	86	13	275	304	498	-10	-45
Miscellaneous:										
Scoter-----	--	--	--	4	--	4	6	29	-33	-86
Merganser-----	--	--	--	1	--	1	7	Trace	-86	--
Subtotal-----	--	--	--	5	--	5	13	29	-62	-83
Total ducks-----	321	557	679	375	106	2,038	3,254	4,148	-37	-51
Coot-----	2	10	11	4	4	31	66	128	-53	-76

TABLE E-16.--Duck breeding populations, Montana, 1960 and 1961

	Sheridan County	Hi-Line		Great Falls- Piedmont	Total
		Eastern	Central		
Total area (sq. mi.)-----	1,440	7,926	9,468	7,020	25,854
Area sampled (sq. mi.)-----	38	172	94	143	447
Ducks per sq. mi.:					
12 year average-----	30.1	5.0	10.8	8.7	9.5
1960-----	27.4	5.7	15.0	6.4	9.5
1961-----	24.3	6.6	10.5	4.9	8.6
Population index:					
12 year average-----	23,500	39,600	122,000	92,000	277,200
1960-----	39,500	45,200	142,000	44,900	271,600
1961-----	35,000	52,300	99,400	34,400	221,100
Percent change, 1961 from:					
1960-----	-11	+16	-30	-23	-19
Average-----	+49	+32	-19	-63	-20

TABLE E-17.--Number and species composition of waterfowl, Flathead Valley waterfowl breeding-ground survey, Montana, 1959-61

Species	Number seen in--		
	1959	1960	1961
Ducks:			
Dabblers:			
Pintail-----	2	9	7
Mallard-----	17	100	109
American widgeon-----	8	8	14
Shoveler-----	14	45	17
Gadwall-----	9	18	21
Teal ¹ -----	90	115	87
Subtotal-----	140	295	255
Divers:			
Scap-----	1	6	7
Redhead-----	111	190	182
American goldeneye-----	0	1	2
Barrows goldeneye-----	0	1	0
Ruddy duck-----	32	21	39
Subtotal-----	144	219	230
Total ducks-----	284	514	485
Coot-----	110	133	148
Grand total-----	394	647	633

¹Includes blue-winged, green-winged, and cinnamon teal.

TABLE E-18.--Canada goose breeding population by areas, Montana, 1958-61

	Hi-Line	Helena	Great Falls-Piedmont	Total
Pairs:				
1958-----	374	--	--	--
1959-----	548	97	35	680
1960-----	652	48	32	732
1961-----	395	103	35	533
Singles:				
1958-----	252	--	--	--
1959-----	63	17	16	96
1960-----	66	25	14	205
1961-----	81	47	9	137
Groups:				
1958-----	89	--	--	--
1959-----	120	97	0	217
1960-----	95	56	17	168
1961-----	68	58	15	141
Total:				
1958-----	1,089	--	--	--
1959-----	1,279	308	86	1,673
1960-----	1,565	177	95	1,837
1961-----	939	311	94	1,344
Percent change, 1961 from 1960-----	-40	+76	No change	-27

TABLE E-19.--Waterfowl breeding populations, by species and stratum, North Dakota, South Dakota, and western Minnesota, 1960 and 1961

[Index numbers, in thousands]

Species	Stratum			Total		Percent change
	East	Central	West	1961	1960	
Ducks:						
Dabblers:						
Pintail-----	32	83	20	135	201	-33
Mallard-----	90	108	57	255	206	+24
American widgeon-----	--	7	--	7	10	-30
Shoveler-----	16	37	4	57	86	-34
Gadwall-----	8	20	2	30	32	-6
Blue-winged teal-----	88	55	21	164	154	+6
Green-winged teal-----	--	2	--	2	--	--
Subtotal-----	234	312	104	650	689	-6
Divers:						
Scaup-----	18	8	1	27	44	-39
Canvasback-----	3	5	--	8	9	-11
Redhead-----	2	7	--	9	24	-62
Ring-necked duck-----	2	--	--	2	Trace	--
Ruddy duck-----	3	3		6	15	-60
Subtotal-----	28	23	1	52	92	-44
Total ducks-----	262	335	105	702	781	-10
Coot-----	62	29	1	93	80	+16

TABLE E-20.--Waterfowl breeding populations, North Dakota, South Dakota, and western Minnesota, 1958-61

[Index numbers, in thousands]

Species	1958	1959	1960	1961
Ducks:				
Dabblers:				
Pintail-----	217	22	201	135
Mallard-----	420	166	206	255
American widgeon-----	12	29	10	7
Shoveler-----	58	21	86	57
Gadwall-----	30	7	32	30
Blue-winged teal-----	165	127	154	164
Green-winged teal-----	1	--	--	2
Subtotal-----	903	372	689	650
Divers:				
Scaup-----	8	25	44	27
Canvasback-----	25	10	9	8
Redhead-----	9	2	24	9
Ring-necked duck-----	--	--	Trace	2
Ruddy duck-----	8	4	15	6
Subtotal-----	50	41	92	52
Total ducks-----	953	413	781	702
Coot-----	30	88	80	93

TABLE E-21.--Waterfowl breeding populations, by species, North Dakota, 1948-61
 [Index numbers]

Species	1948-60 Average	1960	1961	Percent change from:		Percent species composition, 1961
				Average	1960	
Ducks:						
Dabblers:						
Pintail-----	265,200	237,400	155,300	-41	-35	15.6
Mallard-----	156,200	131,500	129,500	-17	-2	13.1
American widgeon-----	19,700	19,000	28,700	+46	+51	2.9
Shoveler-----	97,800	103,700	112,200	+15	+8	11.3
Gadwall-----	72,600	76,200	150,700	+108	+98	15.2
Blue-winged teal-----	324,300	234,600	303,300	-6	+29	30.5
Green-winged teal-----	3,700	5,500	10,900	+197	+98	1.1
Subtotal-----	939,500	807,900	890,600	-5	+10	89.7
Divers:						
Scaup----- ¹	29,000	28,700	36,300	+25	+27	3.7
Canvasback-----	27,100	24,500	21,200	-22	-14	2.1
Redhead-----	32,100	30,000	34,800	+8	+16	3.5
Ruddy duck-----	13,300	11,000	8,000	-40	-27	.8
Subtotal-----	101,500	94,200	100,300	-1	+6	10.1
Miscellaneous:						
Others-----	1,100	600	2,400	+120	+277	.2
Total ducks-----	1,042,100	902,700	993,300	-5	+10	100.0
Coot-----	147,700	181,600	110,900	-25	-39	--

¹ The 1955 index for scaup omitted; considered erroneous due to delayed departure of migrating scaup from State that year.

TABLE E-22.--Ratios of lone to paired drakes during breeding population surveys, North Dakota, 1956-61

Year	Pintail	Mallard	Canvasback	Blue-winged teal
1956-----	199:100	125:100	111:100	37:100
1957-----	259:100	172:100	235:100	55:100
1958-----	161:100	129:100	105:100	44:100
1959-----	218:100	121:100	¹ 12:100	55:100
1960-----	294:100	169:100	90:100	61:100
1961-----	193:100	93:100	43:100	37:100

¹ May be due to sampling error.

TABLE E-23.--Waterfowl breeding population survey data, South Dakota, 1950-61

	Population index	Number per square mile
Ducks:		
1961:		
Stratum 1-----	100,000	4.66
Stratum 2-----	134,300	5.25
Stratum 3-----	76,200	2.87
Total-----	310,500	4.22
1960-----	316,600	4.30
Average, 1950-60-----	550,100	7.65
Percent change, 1961 from--		
1960-----	-2	--
Average-----	-44	--
Coot:		
1961-----	7,700	.10
1960-----	20,500	.28
Percent change-----	-62	--

TABLE E-24.--Duck breeding population indexes, by stratum, Nebraska, 1960 and 1961

Species ¹	Stratum						Total		
	Sand hills			South-central					
	1960	1961	Percent change	1960	1961	Percent change	1960	1961	Percent change
Dabblers:									
Pintail-----	17,000	12,700	-25	5,500	2,900	-47	22,400	15,600	-30
Mallard-----	21,500	23,700	+10	2,900	4,300	+48	24,500	28,000	+14
American widgeon-----	200	2,200	+700	1,200	200	-83	1,400	2,400	+71
Shoveler-----	12,000	12,700	+6	4,500	3,000	-33	16,500	15,700	-5
Gadwall-----	8,300	7,900	-5	1,000	300	-70	9,300	8,200	-12
Blue-winged teal-----	73,800	60,800	-18	19,300	4,200	-78	93,000	65,000	-30
Green-winged teal-----	700	600	-14	1,300	--	--	2,000	600	-70
Subtotal-----	133,500	120,600	-10	35,700	14,900	-58	169,100	135,500	-20
Divers:									
Scaup-----	2,800	9,800	+250	1,900	100	-95	4,700	9,900	+111
Canvasback-----	600	600	No change	--	--	--	600	600	No change
Redhead-----	4,900	6,000	+22	600	1,300	+117	5,600	7,300	+30
Ring-necked duck-----	--	1,000	--	--	--	--	--	1,000	--
Bufflehead-----	--	300	--	--	--	--	--	300	--
Ruddy duck-----	1,800	3,500	+94	--	--	--	1,800	3,500	+94
Subtotal-----	10,100	21,200	+110	2,500	1,400	-44	12,700	22,600	+78
Total-----	143,600	141,800	-1	38,200	16,300	-57	181,800	158,100	-13

¹ Species composition based on ground observations.

TABLE E-25.--Waterfowl breeding populations, by stratum, northern Saskatchewan, northern Manitoba, and western Ontario, May 1960 and 1961

[Index numbers, in thousands]

Species	Stratum					Total		Percent change	
	Ontario C	Manitoba		Saskatchewan C		1961	1960		
		D	C	South	North				
Ducks:									
Dabblers:									
Pintail-----	2	8	5	35	8	58	34	+70	
Mallard-----	64	35	45	44	32	220	260	-15	
American widgeon-----	4	3	3	12	--	22	24	-8	
Shoveler-----	--	6	--	--	--	6	6	No change	
Gadwall-----	--	3	1	9	2	15	1	+1,400	
Blue-winged teal-----	--	2	--	1	--	3	9	-67	
Green-winged teal-----	2	1	--	1	2	6	6	No change	
Black duck-----	25	--	1	--	5	31	10	+210	
Subtotal-----	97	58	55	102	49	361	350	+3	
Divers:									
Scaup-----	51	30	52	56	23	212	209	+1	
Canvasback-----	4	32	--	14	--	50	107	-53	
Redhead-----	--	18	--	4	--	22	32	-31	
Ring-necked duck-----	1	Trace	8	2	4	15	12	+25	
Goldeneye-----	29	4	15	10	15	73	84	-13	
Bufflehead-----	5	8	4	4	--	21	82	-74	
Ruddy duck-----	6	1	--	--	--	7	Trace	--	
Subtotal-----	96	93	79	90	42	400	526	-24	
Miscellaneous:									
Scooter-----	2	Trace	26	6	--	34	15	+127	
Merganser-----	93	1	19	4	10	127	252	-50	
Subtotal-----	95	1	45	10	10	161	267	-40	
Total ducks-----	288	152	179	202	101	922	1,143	-19	
Canada geese-----	--	1	9	1	1	12	8	+50	
Coot-----	--	30	--	--	--	30	11	+173	

TABLE E-26.--Waterfowl breeding populations, by species, northern Saskatchewan, northern Manitoba, and western Ontario, May 1954-61

[Index numbers, in thousands]

Species	1954	1955	1956	1957	1958	1959	1960	1961
Ducks:								
Dabblers:								
Pintail-----	22	47	17	12	6	17	34	58
Mallard-----	256	249	246	260	264	245	260	220
American widgeon-----	26	33	8	7	8	17	24	22
Shoveler-----	3	1	--	1	--	5	6	6
Gadwall-----	--	1	--	4	--	10	1	15
Blue-winged teal-----	8	4	3	1	18	12	9	3
Green-winged teal-----	6	13	6	6	--	16	6	6
Black duck-----	93	75	1	--	6	16	10	31
Subtotal-----	414	423	281	291	302	338	350	361
Divers:								
Scaup-----	266	441	187	446	269	329	209	212
Canvasback-----	18	22	6	2	22	27	107	50
Redhead-----	8	10	4	6	--	--	32	22
Ring-necked duck-----	40	80	8	1	--	--	12	15
Goldeneye-----	48	38	5	9	69	187	84	73
Bufflehead-----	23	39	12	5	20	23	82	21
Ruddy duck-----	3	--	--	--	--	--	Trace	7
Subtotal-----	406	630	222	469	380	566	526	400
Miscellaneous:								
Scoter-----	43	49	7	53	36	64	15	34
Merganser-----	244	310	62	133	218	106	252	127
Subtotal-----	287	359	69	186	254	170	267	161
Total ducks-----	1,107	1,412	572	946	936	1,074	1,143	922
Canada geese-----	28	24	14	5	--	35	8	12
Coot-----	--	--	--	--	--	13	11	30

TABLE E-27.--Waterfowl breeding populations by species and stratum, southern Manitoba, May 1960 and 1961
 [Index numbers, in thousands]

Species	1960			1961			Percent change
	Stratum A	Stratum B	Total	Stratum A	Stratum B	Total	
Ducks:							
Dabblers:							
Pintail-----	43	54	97	23	20	43	-56
Mallard-----	142	180	322	92	119	211	-34
American widgeon-----	7	5	12	12	8	20	+67
Shoveler-----	19	35	54	19	20	39	-28
Gadwall-----	3	1	4	6	4	10	+150
Blue-winged teal-----	52	43	95	57	27	84	-12
Green-winged teal-----	1	1	2	2	3	5	+150
Subtotal-----	267	319	586	211	201	412	-30
Divers:							
Scaup-----	81	65	146	70	45	115	-21
Canvasback-----	18	19	37	24	7	31	-16
Redhead-----	6	20	26	8	2	10	-62
Ring-necked duck-----	1	4	5	3	3	6	+20
Goldeneye-----	2	3	5	1	3	4	-20
Bufflehead-----	1	3	4	2	1	3	-25
Ruddy duck-----	11	5	16	9	9	18	+12
Subtotal-----	120	119	239	117	70	187	-22
Miscellaneous:							
Others-----	Trace	--	Trace	Trace	2	2	--
Total ducks-----	387	438	825	328	273	601	-27
Coot-----	41	55	96	28	52	80	-17

TABLE E-28.--Waterfowl breeding populations, by species, southern Manitoba, May 1953-61
 [Index numbers, in thousands]

Species	1953	1954	1955	1956	1957	1958	1959	1960	1961
Ducks:									
Dabblers:									
Pintail-----	46	62	130	150	99	76	52	97	43
Mallard-----	150	252	356	491	500	512	304	322	211
American widgeon-----	13	17	28	27	25	91	46	12	20
Shoveler-----	4	19	25	28	38	28	48	54	39
Gadwall-----	8	8	8	5	6	8	5	4	10
Blue-winged teal-----	39	67	88	53	63	141	158	95	84
Green-winged teal-----	--	8	4	2	3	7	4	2	5
Subtotal-----	260	433	639	756	734	863	617	586	412
Divers:									
Scaup-----	78	93	128	79	60	274	178	146	115
Canvasback-----	12	30	28	39	31	61	19	37	31
Redhead-----	12	18	25	21	17	32	38	26	10
Ring-necked duck-----	--	4	2	7	4	7	16	5	6
Goldeneye-----	--	6	4	4	5	7	10	5	4
Bufflehead-----	--	8	6	2	Trace	3	4	4	3
Ruddy duck-----	--	4	12	7	7	8	14	16	18
Subtotal-----	102	163	205	159	124	392	279	239	187
Miscellaneous:									
Others-----	--	1	Trace	2	1	1	9	Trace	2
Total ducks-----	362	597	844	917	859	1,256	905	825	601
Coot-----	--	13	28	40	21	81	166	96	80

TABLE E-29.--Percentage species composition of duck breeding population, Michigan, 1960 and 1961

Species	1960	1961
Mallard-----	29.4	24.2
Black duck-----	26.8	22.2
Blue-winged teal-----	29.2	34.3
Wood duck-----	5.0	4.8
Ring-necked duck-----	7.1	3.2
Merganser-----	1.2	2.1
Unidentified-----	1.2	5.4

TABLE E-30.--Duck breeding population indexes, Michigan, 1951-61

Year	Lineal miles censused	Potential breeders per lineal mile	
		Wood duck	All species
1951-----	120.0	0.32	8.18
1952-----	82.0	.21	7.13
1953-----	95.5	.85	12.75
1954-----	93.5	.58	12.31
1955-----	111.2	.70	11.00
1956-----	110.5	.28	11.48
1957-----	135.4	.46	9.30
1958-----	121.0	.33	15.00
1959-----	135.0	.65	13.46
1960-----	124.4	.66	13.26
1961-----	126.4	.83	17.07

TABLE E-31.--Adult wood ducks observed during April-May surveys, Indiana, 1952-61

[Survey of 3 streams totaling 47 miles]

Year	Birds observed	
	Male	Female
1952-----	48	33
1953-----	85	31
1955-----	61	21
1956-----	46	15
1957-----	45	17
1958-----	84	37
1959-----	81	63
1960-----	80	56
Average, 1952-60-----	66.2	34.1
1961-----	99	51
Percent change from--		
1960-----	+24	-9
Average-----	+50	+50

TABLE E-32.--Duck breeding populations, by stratum, Maritime Provinces, 1960 and 1961

[Index numbers]

Species	Stratum			Total		Percent change	
	New Brunswick	Nova Scotia		Prince Edward Island	1961		
		North Shore	Cape Breton				
Ducks:							
Dabblers:							
Pintail-----	--	--	--	24	24	18	+33
Mallard-----	--	--	--	2	2	--	--
American widgeon-----	--	9	--	31	40	42	- 5
Shoveler-----	--	2	--	--	2	--	--
Blue-winged teal-----	20	8	10	78	116	119	- 3
Green-winged teal-----	15	1	3	15	34	16	+112
Black duck-----	196	44	56	98	394	272	+45
Wood duck-----	12	--	--	--	12	--	--
Subtotal-----	243	64	69	248	624	467	+34
Divers:							
Scaup-----	--	--	--	--	--	72	--
Ring-necked duck-----	43	22	50	66	181	101	+79
Goldeneye-----	33	--	6	2	41	47	-13
Subtotal-----	76	22	56	68	222	220	No change
Miscellaneous:							
Old squaw and scoter-----	--	--	--	--	--	23	--
Merganser-----	--	11	113	16	140	101	+39
Subtotal-----	--	11	113	16	140	124	+13
Total ducks-----	319	97	238	332	986	811	+21
Brant-----	--	716	160	--	876	638	+37
Canada geese-----	--	--	--	--	--	13	--

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F. PRODUCTION SURVEY TABLES

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TABLE F-1.--Number and size of duck broods, Tetlin and Fort Yukon study areas, Alaska, 1960 and 1961

Species	Tetlin				Fort Yukon			
	1960		1961		1960		1961	
	Number of broods	Average size						
Dabblers:								
Pintail-----	17	6.1	19	6.2	15	6.8	35	5.5
Mallard-----	43	7.9	34	6.9	14	7.1	20	6.7
American widgeon--	59	7.4	74	6.3	75	6.4	84	7.1
Shoveler-----	7	6.9	2	7.0	18	7.2	13	6.8
Blue-winged teal--	3	7.0	2	9.0	--	--	--	--
Green-winged teal--	31	6.6	42	6.3	23	7.2	31	6.6
Subtotal-----	160	7.2	173	6.4	145	6.7	183	6.6
Divers:								
Scaup-----	44	8.1	14	8.4	62	7.5	18	7.7
Canvasback-----	18	6.1	14	5.7	16	6.3	15	6.5
Redhead-----	6	4.8	--	--	--	--	--	--
Ring-necked duck--	1	5.0	--	--	--	--	--	--
Goldeneye-----	10	5.7	4	4.5	13	7.0	3	8.3
Bufflehead-----	27	5.4	31	6.4	37	7.1	7	7.0
Subtotal-----	106	6.6	63	6.6	128	7.2	43	7.2
Miscellaneous: Scoter	14	10.6	5	10.2	5	6.8	2	7.0
Total ducks-----	280	7.1	241	6.6	278	7.0	228	6.6

TABLE F-2.--Average size of duck broods by age class, Minto Lakes study area, Alaska, 1961

Species	Age-class I		Age classes II and III	
	Number of broods	Average size	Number of broods	Average size
Dabblers:				
Pintail-----	6	3.1	72	5.0
Mallard-----	7	4.7	10	5.3
American widgeon-----	103	5.2	20	6.3
Shoveler-----	39	5.7	42	6.6
Green-winged teal-----	13	5.2	29	6.3
Subtotal-----	168	5.2	173	6.0
Divers:				
Scaup-----	73	7.0	0	--
Canvasback-----	17	4.1	0	--
Redhead-----	1	5.0	0	--
Subtotal-----	91	6.4	0	--
Total ducks-----	259	5.1	173	6.0

**TABLE F-3.--Waterfowl species composition and nest density,
Kashunuk river study area, Alaska, 1951 and 1961**

Species	Number of nests found in--	
	1951	1961
Ducks:		
Pintail-----	2	5
Old squaw-----	0	1
Spectacled eider-----	8	34
Steller's eider-----	3	1
Subtotal-----	13	41
Geese:		
Cackling goose-----	49	44
Black brant-----	74	261
Subtotal-----	123	305
Total-----	136	346

**TABLE F-4.--Black brant nest and brood data, by years,
Kashunuk study area, Alaska**

	1951	1954	1961
Nests:			
Number located-----	74	--	135
Average clutch size ¹ -----	3.5	--	3.6
Hatching success-----	81%	--	85%
Broods:			
Number counted-----	288	159	454
Average brood size:			
First week ² -----	3.8	--	3.4
Second week ² -----	3.5	--	2.8
Third week ³ -----	3.2	2.2	2.8

¹ Based on clutches that had been incubated 10 to 15 days.

² Age-class I.

³ Age-class II.

TABLE F-5.--Waterfowl brood and late-nesting indexes, by species, southern Alberta, July 1960 and 1961
 [Index numbers, in thousands]

	Stratum A			Stratum B			Stratum C			Total		
	1960	1961	Percent change	1960	1961	Percent change	1960	1961	Percent change	1960	1961	Percent change
Broods:												
Duck brood index---	52	38	-27	107	160	+50	24	13	-46	183	212	+16
Avg. brood size ¹ ---	5.61	5.55	--	6.23	5.88	--	5.74	4.80	--	5.98	5.74	--
Coot brood index---	5	3	-40	26	44	+69	1	7	+600	32	54	+69
Late-nesting index:												
Dabblers:												
Pintail-----	1	1	--	1	1	--	1	Trace	--	2	2	--
Mallard-----	2	1	--	3	1	--	1	Trace	--	7	2	--
American widgeon-	--	--		Trace	--	--	--	--		Trace	Trace	--
Shoveler-----	1	--	--	1	Trace	--	1	--	--	3	Trace	--
Gadwall-----	1	1	--	--	--	--	1	2	--	2	2	--
Blue-winged teal--	1	1	--	Trace	--	--	1	1	--	2	2	--
Subtotal-----	6	4	-33	5	2	-60	5	3	-40	16	8	-50
Divers:												
Scaup-----	--	2	--	2	1	--	4	3	--	6	5	--
Redhead-----	--	--	--	Trace	--	--	--	--		Trace	--	--
Ring-necked duck-	--	--	--	--	--	--	Trace	--	--	Trace	--	--
Bufflehead-----	--	--	--	Trace	--	--	--	--		Trace	--	--
Ruddy duck-----	1	1	--	6	--	--	Trace	1	--	8	2	--
Subtotal-----	1	3	-67	8	1	-87	4	4	NC	14	7	-50
Total-----	7	7	NC	13	3	-77	9	7	-22	30	15	-50

¹ Class II and III only.

TABLE F-6.--Trend in July waterfowl brood and late-nesting indexes, by species, southern Alberta, 1953-61

[Index numbers, in thousands]

	1953	1954	1955	1956	1957	1958	1959	1960	1961
Broods:									
Duck brood index-----	165	217	285	250	337	377	224	183	212
Average brood size ¹ -----	5.51	5.64	5.94	6.04	6.25	6.30	4.85	5.98	5.74
Coot brood index-----	--	--	66	62	75	107	29	32	34
Late-nesting index:									
Dabblers:									
Pintail-----	40	6	9	3	1	2	3	2	2
Mallard-----	38	28	18	11	9	10	16	7	2
American widgeon-----	9	5	6	3	2	4	2	Trace	Trace
Shoveller-----	5	5	2	1	3	2	2	3	Trace
Gadwall-----	10	8	8	2	4	4	12	2	2
Blue-winged teal-----	10	11	9	4	4	3	7	2	2
Green-winged teal-----	1	2	Trace	--	Trace	--	1	--	--
Cinnamon teal-----	--	--	--	--	--	--	--	--	--
Subtotal-----	113	57	52	24	23	25	43	16	8
Divers:									
Scaup-----	18	23	21	25	19	21	21	6	5
Canvasback-----	--	2	Trace	1	1	--	2	--	--
Redhead-----	5	1	1	1	1	Trace	2	Trace	--
Ringnecked duck-----	--	--	--	--	--	--	2	Trace	--
Goldeneye-----	--	--	1	--	1	1	Trace	--	--
Bufflehead-----	--	--	1	Trace	--	1	1	--	Trace
Ruddy duck-----	4	6	4	14	3	6	5	8	2
Subtotal-----	27	32	28	41	25	29	33	14	7
Miscellaneous: Scoter-----	--	--	Trace	--	Trace	Trace	1	--	--
Total-----	140	89	80	65	48	54	77	30	15

¹ Class II and III broods only.

TABLE F-7.--Water fowl fall population indexes, Washington, 1960 and 1961

[Includes young]

Area	1960	1961	Percent change
Ducks:			
Eastern Washington-----	390,100	465,000	+19
Western Washington-----	39,700	53,000	+34
Total-----	429,800	518,000	+21
Canada geese:			
Eastern Washington-----	11,000	11,800	+ 7

TABLE F-8.--Number of duck broods, by species, observed on south-central Idaho trend routes, 1958-61

Species	Mallard	American widgeon	Blue-winged and cinnamon teal	Green- winged teal	Redhead	Total
Milner Canal:						
1958-----	23	--	1	--	3	27
1959-----	16	2	--	1	--	19
1960-----	23	3	3	2	--	31
1961-----	22	--	4	1	1	28
Richfield Canal:						
1958-----	2	6	--	--	--	8
1959-----	4	6	--	1	--	11
1960-----	4	2	--	--	--	6
1961 ¹ -----	--	--	--	--	--	--
Bypass:						
1958-----	9	7	--	--	--	16
1959-----	3	4	--	--	--	7
1960-----	2	8	--	--	--	10
1961 ¹ -----	--	--	--	--	--	--
Dietrick Canal:						
1958-----	6	5	--	--	--	11
1959-----	2	4	--	--	--	6
1960-----	17	2	1	1	--	21
1961 ¹ -----	--	--	--	--	--	--
Total:-----	133	49	9	6	4	201
1958-----	40	18	1	--	3	62
1959-----	25	16	--	2	--	43
1960-----	46	15	4	3	--	68
1961 ² -----	22	--	4	1	1	28

¹ Water levels too low to permit operation of brood count routes.² Total not comparable with preceding years.

TABLE F-9.--Number of broods, by species, observed on trend routes in southeastern Idaho, 1953-61

Species	1953	1954	1955	1956	1958	1959	1960	1961
Camas Refuge:¹								
Dabblers:								
Pintail-----	4	4	2	4	3	3	2	7
Mallard-----	9	22	6	19	14	14	9	21
American widgeon-----	1	--	--	3	1	2	3	2
Shoveler-----	1	--	2	1	2	2	--	1
Gadwall-----	7	9	8	7	5	3	2	--
Blue-winged and cinnamon teal-----	1	2	3	1	3	7	--	6
Green-winged teal-----	1	1	--	--	1	1	4	7
Subtotal-----	24	38	21	35	29	32	20	44
Divers:								
Lesser scaup-----	4	8	5	6	7	--	1	1
Canvasback-----	--	1	--	--	1	2	1	--
Redhead-----	17	4	3	14	10	9	2	1
Ruddy duck-----	9	3	--	4	1	--	--	3
Subtotal-----	30	16	8	24	19	11	4	5
Unidentified-----	9	10	9	30	8	11	4	3
Total-----	63	64	38	89	56	54	28	52
Blackfoot Reservoir:^{1 2}								
Dabblers:								
Pintail-----	6	4	2	--	8	20	16	--
Mallard-----	14	14	12	8	28	30	35	--
American widgeon-----	4	4	6	11	10	18	2	--
Shoveler-----	--	--	--	--	--	--	--	--
Gadwall-----	28	33	23	41	54	15	23	--
Blue-winged and cinnamon teal-----	--	5	7	3	2	4	10	--
Green-winged teal-----	1	1	1	--	1	7	1	--
Subtotal-----	53	61	51	63	103	94	87	--
Divers:								
Lesser scaup-----	12	8	6	12	8	2	2	--
Canvasback-----	--	--	--	--	--	1	--	--
Redhead-----	--	5	3	--	1	1	3	--
Ruddy duck-----	--	--	--	--	--	--	--	--
Subtotal-----	12	13	9	12	9	4	5	--
Unidentified-----	13	4	5	4	13	14	38	--
Total-----	78	78	65	79	125	112	130	--

¹ No routes were censused in 1957.² Water levels too low in 1961 to permit operation of trend route.

TABLE F-10.--Canada goose production trends, Oregon, 1958-61

Transect	Number of broods				Number of young			
	1958	1959	1960	1961	1958	1959	1960	1961
Klamath River-----	150	124	168	185	722	533	756	834
Klamath Marsh-----	34	48	52	42	163	206	236	189
Sprague River-----	44	40	37	34	209	172	165	153
Alkali Lake-----	10	13	5	13	49	58	23	58
Spring Lake-----	8	11	11	10	39	47	50	46
Muss Lake-----	--	10	26	49	--	41	119	221
Agency Lake-----	--	66	43	43	--	285	194	192
Wocus Lake-----	--	72	29	35	--	310	133	156
Summer Lake-----	74	75	55	63	343	283	265	261
Silver Lake-----	58	47	57	68	248	241	236	284
Abert Lake-----	26	26	18	14	114	119	87	57
Total-----	404	532	501	556	1,887	2,295	2,264	2,451
Percent change, 1961 from--								
1960-----	--	--	--	+11	--	--	--	+8
Average, 1958-60-----	--	--	--	+16	--	--	--	+14

TABLE F-11.--Duck production trend, by areas, Oregon, 1958-61

Transect	Square miles	Number of broods				Number of young			
		1958	1959	1960	1961	1958	1959	1960	1961
Klamath River-----	10.0	137	333	115	72	717	1,841	746	378
Klamath Marsh-----	11.0	104	262	124	223	662	1,603	821	1,894
E. Upper Klamath Lake-----	7.5	195	315	111	80	1,101	1,887	725	534
W. Upper Klamath Lake-----	8.5	52	264	102	56	268	1,477	760	408
Summer Lake-----	1.0	72	73	71	115	553	545	591	806
Abert Lake-----	3.4	27	24	21	23	205	162	173	144
Silver Lake-----	1.0	21	15	8	0	175	83	67	0
Paulina Marsh-----	.8	11	14	6	0	90	98	48	0
Umatilla County-----	4.0	9	7	8	10	46	31	44	64
Jefferson County-----	.5	9	7	10	10	71	56	75	75
Malheur County-----	60.0	119	59	78	82	763	284	445	474
Total-----	107.7	756	1,373	654	671	4,651	8,067	4,495	4,777
Percent change, 1961 from--									
1960-----	--	--	--	--	+3	--	--	--	+6
Average 1958-60-----	--	--	--	--	-28	--	--	--	-17

TABLE F-12. --Duck production trend, by species, Oregon, 1958-61

[Comparative trends on 107.7 sq. mi.]

Species	Number of broods				Number of young			
	1958	1959	1960	1961	1958	1959	1960	1961
Dabblers:								
Pintail-----	19	21	19	14	148	137	136	85
Mallard-----	203	281	98	169	1,234	1,502	696	989
Shoveler-----	1	2	2	2	7	14	16	11
Gadwall-----	59	76	57	44	417	541	441	333
Blue-winged and cinnamon teal-----	47	171	47	65	319	1,144	345	431
Green-winged teal-----	2	0	0	0	10	0	0	0
Wood duck-----	0	2	0	1	0	9	0	6
Subtotal-----	331	553	223	295	2,135	3,347	1,634	1,855
Divers:								
Scaup-----	5	27	22	9	29	191	130	54
Canvasback-----	0	46	0	0	0	276	0	0
Redhead-----	295	621	189	120	1,706	3,453	1,335	873
Ruddy duck-----	109	117	100	227	674	727	645	1,903
Subtotal-----	409	811	311	356	2,409	4,647	2,110	2,830
Unclassified-----	6	2	120	20	36	19	751	92
Total-----	746	1,366	654	671	4,580	8,013	4,495	4,777

TABLE F-13. --Fall waterfowl population indexes, by species and area, California, 1961

Species	Sacramento Valley	Suisun Marsh	North San Joaquin Valley	South San Joaquin Valley	North-eastern California	Klamath Basin	Total
Ducks:							
Dabblers:							
Pintail-----	1,230	--	350	280	5,810	2,750	10,420
Mallard-----	95,220	2,290	3,550	4,420	20,000	14,940	140,420
Shoveler-----	--	--	320	--	750	3,050	4,120
Gadwall-----	1,000	1,760	760	170	4,500	10,930	19,120
Cinnamon teal-----	5,830	530	1,360	500	4,030	3,340	15,590
Subtotal-----	103,280	4,580	6,340	5,370	35,090	35,010	189,670
Divers:							
Scaup-----	--	--	--	--	870	2,970	3,840
Redhead-----	--	--	160	--	5,090	9,800	15,050
Ruddy-----	--	--	250	--	1,380	9,830	11,460
Subtotal-----			410		7,340	22,600	30,350
Miscellaneous-----	720	90	220	90	1,100	1,150	3,370
Total ducks-----	104,000	4,670	6,970	5,460	43,530	58,760	223,390
Canada goose-----	--	--	--	--	11,440	8,350	19,790
Coot-----	91,050	330	13,250	5,460	9,360	37,050	156,500

TABLE F-14.--Nesting pair and fall population estimates, by species, California, 1958-61

Species	Nesting pairs				Fall population index ¹			
	1958	1959	1960	1961	1958	1959	1960	1961
Ducks:								
Dabblers:								
Pintail-----	6,850	3,380	1,760	2,160	31,030	15,560	10,870	10,420
Mallard-----	31,250	32,750	40,500	33,110	146,470	150,190	179,310	140,420
Shoveler-----	2,150	1,060	820	620	12,120	5,820	7,140	4,120
Gadwall-----	2,970	3,500	3,850	3,930	22,570	20,100	24,760	19,120
Cinnamon teal-----	2,220	4,330	5,870	4,080	10,670	18,800	22,740	15,590
Subtotal-----	45,440	45,020	52,800	43,900	222,860	210,470	244,820	189,670
Divers:								
Scaup-----	710	740	770	720	5,730	4,040	5,390	3,840
Redhead-----	2,670	3,030	3,330	2,740	20,900	17,080	21,280	15,050
Ruddy duck-----	2,170	1,930	3,040	3,580	12,750	8,890	13,350	11,460
Subtotal-----	5,550	5,700	7,140	7,040	39,380	30,010	40,020	30,350
Miscellaneous-----	450	725	600	700	2,740	2,980	3,730	3,370
Total ducks-----	51,440	51,445	60,540	51,640	264,980	243,460	288,570	223,390
Canada goose-----	4,360	4,540	1,620	1,890	25,190	23,130	18,570	19,790
Coot-----	23,460	29,820	13,880	31,320	127,760	146,870	75,210	156,500

¹ Includes young and resident adults.

TABLE F-15.--Number of young produced on key waterfowl areas, Nevada, 1959-61

Species	West-central Nevada			Northeastern Nevada			Total		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
Ducks:									
Dabblers:									
Pintail-----	117	22	26	25	72	30	142	94	56
Mallard-----	443	131	174	179	334	411	622	465	585
American widgeon-----	10	--	22	10	16	5	20	16	27
Shoveler-----	9	--	--	4	18	8	13	18	8
Gadwall-----	813	384	287	50	72	103	863	456	390
Cinnamon teal-----	671	352	264	127	192	142	798	544	406
Subtotal-----	2,063	889	773	395	704	699	2,458	1,593	1,472
Divers:									
Scaup-----	--	--	--	37	50	15	37	50	15
Canvasback-----	--	--	--	--	55	66	--	55	66
Redhead-----	2,639	366	87	5	5	31	2,644	371	118
Ruddy duck-----	670	48	68	8	7	--	678	55	68
Subtotal-----	3,309	414	155	50	117	112	3,359	531	267
Total ducks-----	5,372	1,303	928	445	821	811	5,817	2,124	1,739
Canada goose-----	605	315	261	--	231	280	605	546	541

TABLE F-16.--Canada goose production, Utah, 1957-61

Area	Number of broods					Number of young				
	1957	1958	1959	1960	1961	1957	1958	1959	1960	1961
Round Valley-----	20	¹ 17	(²)	(²)	(²)	97	¹ 77	(²)	(²)	(²)
Cutler Reservoir-----	15	29	20	27	37	81	141	95	122	180
Public shooting grounds-----	12	18	11	20	20	68	84	57	99	84
Bear River Refuge and vicinity-----	310	216	261	341	440	1,400	¹ ,080	--	1,568	2,112
Ogden Bay Refuge-----	61	75	76	78	70	317	360	334	412	310
Farmington Bay Refuge-----	36	37	39	40	47	210	191	225	192	250
Scipio Reservoir-----	5	6	3	1	3	24	22	16	4	13
Fool's Creek Reservoir-----	5	11	6	6	Dry	24	66	32	31	Dry
Redmond Lake-----	8	10	6	12	12	45	60	32	72	72
Gunnison Reservoir-----	18	7	10	8	2	85	38	48	41	13
Clear Lake Refuge-----	6	7	2	0	5	30	28	9	0	24
Stewart Lake Refuge-----	4	3	0	2	1	21	16	0	11	6
Mona Reservoir-----	6	6	7	0	6	33	34	32	0	31
Wales Reservoir-----	3	3	7	11	12	15	20	37	62	70
Rich Co. (Bear River)-----	29	37	37	41	50	150	164	172	179	257
Otter Creek-----	(²)	9	(²)	(²)	(²)	(²)	46	(²)	(²)	(²)
Total-----	538	491	484	587	703	2,600	2,427	2,290	2,793	3,422

¹ Estimated. ² No count.

TABLE F-17.--Waterfowl brood indexes and late-nesting indexes, by species and stratum, southern Saskatchewan, July 1960 and 1961

[Index numbers, in thousands]

Species	Stratum					Total		Average 1952-60	Percent change from--	
	A-east	A-west	B-east	B-west	C	1961	1960		1960	Average
Broods:										
Duck brood index-----	5	17	14	28	6	70	126	292	-44	-76
Average brood size ¹ -----	--	--	--	--	--	4.4	3.8	5.3	+16	-17
Coot brood index-----	--	--	3	3	--	6	15	49	-60	-88
Late-nesting index:²										
Dabblers:										
Pintail-----	1	1	--	--	1	3	10	23	-70	-87
Mallard-----	7	8	12	12	1	40	150	105	-73	-62
American widgeon-----	1	1	--	--	--	2	21	17	-90	-88
Shoveler-----	--	1	--	--	1	2	15	11	-87	-82
Gadwall-----	1	1	--	--	--	2	30	16	-93	-88
Blue-winged teal-----	3	--	--	--	--	3	40	39	-92	-94
Green-winged teal-----	--	--	--	--	--	--	1	3	--	--
Subtotal-----	13	12	12	12	3	52	267	214	-81	-76
Divers:										
Scaup-----	1	3	6	--	--	10	18	23	-44	-57
Canvasback-----	--	--	--	2	--	2	1	6	+100	-67
Redhead-----	--	--	--	--	--	--	5	6	--	--
Ring-necked duck-----	--	1	3	--	--	4	--	2	--	+100
Goldeneye-----	--	--	--	--	--	--	2	1	--	--
Bufflehead-----	--	--	3	--	--	3	--	Trace	--	--
Ruddy duck-----	--	1	--	--	--	1	19	16	-95	-94
Subtotal-----	1	5	12	2	--	20	45	54	-56	-63
Miscellaneous ducks-----	--	--	--	--	--	--	3	2	--	--
Total-----	14	17	24	14	3	72	315	270	-77	-73

¹ Class III broods only.² As indicated by adult pairs and singles.

TABLE F-18.--Waterfowl brood indexes and late-nesting indexes, by species and year, southern Saskatchewan,
July, 1952-61

[Index numbers, in thousands]

Species	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
Broods:										
Duck brood index-----	509	184	100	317	422	616	253	106	126	70
Average brood size ¹ -----	7.1	5.6	4.8	6.0	5.6	6.0	4.3	3.7	3.8	4.4
Coot brood index-----	29	8	4	21	82	254	22	5	15	6
Late-nesting index:²										
Dabblers:										
Pintail-----	14	33	12	79	18	5	32	3	10	3
Mallard-----	44	108	83	180	80	42	183	80	150	40
American widgeon-----	18	21	17	21	12	4	23	15	21	2
Shoveler-----	12	13	5	23	12	2	11	3	15	2
Gadwall-----	12	15	14	28	17	4	17	5	30	2
Blue-winged teal-----	18	35	24	78	54	12	50	36	40	3
Green-winged teal-----	2	4	6	8	2	1	4	1	1	--
Subtotal-----	120	229	161	417	195	70	320	143	267	52
Divers:										
Scaup-----	9	28	11	44	26	28	35	11	18	10
Canvasback-----	1	16	3	16	7	2	8	4	1	2
Redhead-----	3	8	4	8	11	2	8	1	5	--
Ring-necked duck-----	--	3	4	4	Trace	Trace	3	2	--	4
Goldeneye-----	1	--	2	--	--	--	--	1	2	--
Bufflehead-----	--	1	--	1	--	--	--	Trace	--	3
Ruddy duck-----	7	14	18	20	21	8	21	18	19	1
Subtotal-----	21	70	42	93	65	40	75	37	45	20
Miscellaneous ducks:										
Total-----	141	301	204	514	261	110	396	182	315	72

¹ Class III broods only

² As indicated by adult pairs and singles.

TABLE F-19.--Canada goose production by areas, Montana, 1958-61

	Hi-Line	Helena	Great Falls-Piedmont	Total
Adults without young:				
1958-----	91	--	--	--
1959-----	¹ 14	96	56	--
1960-----	74	48	35	157
1961-----	8	73	28	109
Adults with young:				
1958-----	498	--	--	--
1959-----	¹ 303	112	46	--
1960-----	728	153	22	903
1961-----	367	74	28	469
Number of Young:				
1958-----	1,233	--	--	--
1959-----	¹ 679	285	97	--
1960-----	1,519	285	44	1,848
1961-----	861	317	67	1,245
Total:				
1958-----	¹ 1,822	--	--	--
1959-----	1,466	493	199	--
1960-----	2,321	486	101	2,908
1961-----	1,236	464	123	1,823
Percent change, 1961 from 1960----	-47	-5	+22	-37

¹ The 1959 census was not complete. Total numbers indicated are those estimated by the banding crew prior to banding.

TABLE F-20.--Waterfowl production indexes by strata, North Dakota, South Dakota, and western Minnesota, 1960 and 1961

	Stratum			Total
	East	Central	West	
Brood index:				
Ducks:				
1960-----	19,900	48,500	17,200	85,600
1961-----	12,800	34,500	17,500	64,800
Percent change-----	-36	-29	+2	-24
Coot:				
1960-----	--	4,900	--	4,900
1961-----	600	2,000	500	3,100
Percent change-----	--	-59	--	-37
Late-nesting index:				
1960-----	13,000	29,700	5,500	48,200
1961-----	21,900	46,100	5,800	73,800
Percent change-----	+68	+55	+6	+53

TABLE F-21.--Waterfowl production indexes, North Dakota, South Dakota, and Western Minnesota, 1958-61

	1958	1959	1960	1961
Brood index:				
Duck-----	83,300	25,100	85,600	64,800
Coot-----	12,900	2,000	4,900	3,100
Late-nesting index-----	93,600	16,200	48,200	73,800

TABLE F-22.--Percentage species composition of duck broods seen during mid-July surveys, North Dakota, 1960 and 1961

Species	1955-60 average	1960	1961
Dabblers:			
Pintail-----	13.4	20.7	29.8
Mallard-----	17.6	18.3	16.8
American widgeon-----	1.0	2.4	2.4
Shoveler-----	4.1	3.7	11.5
Gadwall-----	14.4	19.5	9.6
Blue-winged teal-----	39.5	23.2	28.9
Subtotal-----	90.0	87.8	99.0
Divers:	#		
Scaup-----	.3	--	--
Canvasback-----	5.4	6.1	.5
Redhead-----	2.8	2.4	--
Ruddy duck-----	1.5	3.7	.5
Subtotal-----	10.0	12.2	1.0
Total-----	100.0	100.0	100.0

TABLE F-23.--Age class composition of duck broods seen during mid-July surveys, North Dakota, 1960 and 1961

Age class	Percent of total		
	1955-60 average	1960	1961
I-----	64.3	75.9	51.9
II-----	30.8	18.4	41.4
III-----	4.9	5.7	6.7

TABLE F-24. --Duck production survey data, South Dakota, 1953-61

Year	Broods	
	Index	Number per sq. mi.
1961:		
Stratum 1-----	5,600	.26
Stratum 2-----	13,900	.54
Stratum 3-----	13,500	.51
Total-----	33,000	.45
1960-----	36,000	.49
Average, 1953-60-----	33,500	.46
Percent change, 1961 from--		
1960-----	-8	--
Average-----	-2	--

TABLE F-25. --Aerial duck production data, Nebraska Sandhills, 1961

	Stratum		Total
	A	B	
Square miles sampled-----	108	36	144
Square miles in stratum-----	10,869	5,363	16,232
Number of broods seen-----	44	5	49
Brood index-----	4,426	744	5,170
Percent by age classes:			
Class I-----	--	--	16
Class II-----	--	--	45
Class III-----	--	--	39

TABLE F-26. --Production survey indexes, by stratum, northern Saskatchewan, northern Manitoba, and western Ontario, July 1955-61

[Index numbers, in thousands]

Year	Stratum					Total	
	Ontario C	Manitoba		Saskatchewan C			
		C	D	South	North		
Number of young: ¹							
1955-----	--	59	30	46	80	215	
1956-----	--	2	7	11	86	106	
1959-----	--	25	20	62	58	165	
1960-----	60	45	26	26	56	213	
1961-----	116	47	37	38	65	303	
Late-nesting index: ²							
1955-----	--	29	10	11	13	63	
1956-----	--	2	7	5	28	42	
1959-----	--	9	4	9	17	39	
1960-----	22	9	6	8	17	62	
1961-----	6	8	16	9	12	51	

¹ Number of broods multiplied by average brood size.² As indicated by adult pairs and singles.

TABLE F-27.--Duck broods, by class and stratum, northern Saskatchewan, northern Manitoba, and western Ontario
1955-1961

Year and class	Ontario C	Stratum				Total broods	Percent of total		
		Manitoba		Saskatchewan C					
		C	D	South	North				
1955:									
Class I-----	--	22	29	27	10	88	56		
Class II-----	--	15	14	23	6	58	37		
Class III-----	--	5	2	4	1	12	7		
1956:									
Class I-----	--	10	16	4	19	49	69		
Class II-----	--	1	4	10	5	20	28		
Class III-----	--	0	0	2	0	2	3		
1959:									
Class I-----	--	2	14	3	0	19	11		
Class II-----	--	6	23	27	5	61	34		
Class III-----	--	11	26	57	4	98	55		
1960:									
Class I-----	4	3	13	2	1	23	10		
Class II-----	13	12	41	8	11	85	35		
Class III-----	24	36	43	25	5	133	55		
1961:									
Class I-----	21	5	35	10	3	74	19		
Class II-----	30	22	73	24	11	160	41		
Class III-----	35	28	51	33	7	154	40		

TABLE F-28.--Waterfowl brood indexes and late-nesting indexes, by species and stratum, southern Manitoba,
July 1960 and 1961

[Index numbers, in thousands]

Species	1961			1960	Average, 1954-60	Percent change from--	
	Stratum A	Stratum B	Total			1960	Average
Broods:							
Duck brood index-----	11	25	36	32	37	+12	-3
Average brood size ¹ -----	--	--	5.5	6.2	5.7	-11	-4
Coot brood index-----	2	3	5	19	8	-74	-38
Late-nesting indexes:							
Dabblers:							
Pintail-----	2	--	2	3	3	-33	-33
Mallard-----	4	4	8	18	20	-56	-60
American widgeon-----	2	1	3	3	4	No change	-25
Shoveler-----	Trace	--	Trace	3	1	--	--
Gadwall-----	Trace	1	1	1	1	No change	No change
Blue-winged teal-----	2	--	2	11	10	-82	-80
Green-winged teal-----	Trace	--	Trace	1	1	--	--
Subtotal-----	10	6	16	40	40	-60	-60
Divers:							
Scaup-----	2	1	3	2	4	+50	-25
Canvasback-----	Trace	1	1	Trace	1	--	No change
Redhead-----	Trace	1	1	1	2	No change	-50
Ring-necked duck-----	Trace	1	1	Trace	1	--	No change
Goldeneye-----	Trace	--	Trace	--	Trace	--	--
Bufflehead-----	Trace	--	Trace	1	1	--	--
Ruddy duck-----	Trace	1	1	4	5	-75	-80
Subtotal-----	2	5	7	8	14	-12	-50
Miscellaneous:							
Others-----	Trace	1	1	--	Trace	--	--
Total ducks-----	12	12	24	48	54	-50	-56

¹ Classes II and III.

TABLE F-29.--Waterfowl brood and late-nesting indexes, by species, southern Manitoba, July 1954-61

[Index numbers, in thousands]

Species	1954	1955	1956	1957	1958	1959	1960	1961
Broods:								
Duck brood index-----	28	23	25	60	63	31	32	36
Average brood size-----	5.7	5.6	5.1	5.6	6.6	5.4	6.2	5.5
Coot brood index-----	6	3	2	16	13	1	19	5
Late-nesting index:								
Dabblers:								
Pintail-----	4	2	3	3	5	2	3	2
Mallard-----	21	22	19	14	24	20	18	8
American widgeon-----	6	2	2	Trace	9	4	3	3
Shoveler-----	1	1	2	Trace	1	Trace	3	Trace
Gadwall-----	3	1	1	1	1	1	1	1
Blue-winged teal-----	7	6	7	3	16	21	11	2
Green-winged teal-----	1	--	2	Trace	1	Trace	1	Trace
Subtotal-----	43	34	36	18	57	48	40	16
Divers:								
Scaup-----	3	1	2	1	11	8	2	3
Canvasback-----	1	2	1	--	4	1	Trace	1
Redhead-----	3	2	3	Trace	3	1	1	1
Ringnecked duck-----	Trace	2	Trace	Trace	2	1	Trace	1
Goldeneye-----	1	--	--	1	Trace	1	--	Trace
Bufflehead-----	1	--	--	--	1	2	1	Trace
Ruddy duck-----	4	8	6	3	6	7	4	1
Subtotal -----	13	15	12		27	21	8	7
Miscellaneous:								
Other-----								
Total ducks-----	56	49	48	21	85	69	48	24

TABLE F-30.--Percentage age-class distribution of duck broods, by stratum, southern Manitoba, 1954-61

Year	Stratum A			Stratum B			Total		
	Class I	Class II	Class III	Class I	Class II	Class III	Class I	Class II	Class III
1954-----	61.5	33.5	5.0	62.9	20.0	17.1	62.2	26.4	11.4
1955-----	41.9	30.2	27.9	17.4	43.5	39.1	29.9	36.7	33.4
1956-----	31.2	41.6	27.2	17.6	50.0	32.4	29.4	42.8	27.8
1957-----	29.2	43.2	27.6	28.1	56.1	15.8	29.1	44.4	26.5
1958-----	51.7	34.5	13.8	45.2	45.2	9.7	51.2	35.4	13.5
1959-----	60.4	32.7	6.8	63.0	34.8	2.2	60.8	33.0	6.2
1960-----	47.4	45.4	7.2	41.0	54.1	4.9	45.9	47.5	6.7
1961-----	35.6	50.0	14.4	28.8	59.1	12.1	30.9	56.3	12.8

TABLE F-31.--Duck production indexes, Michigan, 1951-61

Year	Number per lineal mile			Average brood size
	Broods	Hens and young	Lone drakes	
1951-----	0.35	2.20	3.31	5.76
1952-----	.70	3.92	3.21	4.60
1953-----	.51	3.63	4.32	6.10
1954-----	.20	1.67	4.60	6.24
1955-----	.64	4.65	5.09	6.28
1956-----	.53	3.67	4.40	5.86
1957-----	.38	2.30	4.80	5.10
1958-----	.31	2.18	6.50	5.97
1959-----	.66	4.00	12.58	5.06
1960-----	.33	2.48	14.49	6.50
1961-----	.67	3.80	7.71	5.64

TABLE F-32.--Wood duck production data, Indiana, 1951-61

[Survey of 9 streams totaling 143 miles]

Year	Number per 100 miles		Average brood size
	Broods	Young	
1951-----	64	456	7.1
1952-----	72	513	7.1
1953-----	64	560	8.8
1954-----	63	516	8.3
1955-----	39	337	8.6
1956-----	46	337	7.3
1957-----	52	467	8.9
1958-----	76	725	9.6
1959-----	81	689	8.5
1960-----	71	622	9.6
Average 1951-60-----	62.8	522.2	8.4
1961-----	77	632	8.9
Percent changes, 1961 from 1960-----	+8	+2	-7
Average-----	+23	+21	+6

TABLE F-33.--Wood duck broods observed on streams, Ohio, 1960 and 1961

Month	Miles of stream surveyed		Number of broods seen		Broods per mile	
	1960	1961	1960	1961	1960	1961
May-----	116	95	12	2	.10	.02
June-----	133	95	56	50	.42	.53
July-----	56	80	18	52	.32	.65
Total-----	305	270	86	104	.28	.38

TABLE F-34.--Wood duck nest box utilization, Ohio, 1960 and 1961

	1960	1961
Number of usable boxes-----	1,176	1,420
Number of boxes used-----	373	404
Percentage used-----	32	28

TABLE F-35.--Number of duck broods observed on two wildlife areas, Ohio, 1958-61

Species	Delaware			Killdeer Plains		
	1958	1959	1961	1958	1959	1961
Wood duck-----	23	28	11	10	28	21
Mallard-----	12	8	2	6	--	3
Blue-winged teal-----	7	15	11	11	1	5
Black duck-----	1	2	1	--	--	--
Pintail-----	--	1	--	1	--	--
Unknown-----	--	--	2	3	--	3
Coot-----	--	--	--	5	15	--
Total-----	43	54	27	36	44	32

Note.--No brood studies were conducted in 1960.

TABLE F-36.--Duck nesting effort and production data, Missouri, 1953-61

	1953	1954	1955	1956	1957	1958	1959	1960	1961	Percent change from 1960
Lake and marsh censused (acres)-----	4,976	4,931	7,110	2,222	5,897	6,871	7,884	8,733	13,403	--
Streams censused (miles)-----	371	581	666	564	774	613	583	653	510	--
Wood duck:										
Nesting effort:										
Per sq. mi. of lake and marsh-----	5.8	4.4	3.6	3.1	3.8	5.9	5.0	4.9	2.9	-41
Per mile of stream-----	.24	.22	.13	.10	.13	.15	.22	.11	.27	+145
Broods per mile of stream-----	.09	.04	.03	.04	.04	.06	.13	.03	.12	+300
Average number of ducklings in--										
Class I-----	4.9	5.8	7.3	6.3	7.0	9.0	7.0	8.0	6.4	-20
Class II-----	4.4	7.2	6.2	5.8	6.0	6.3	5.0	7.2	6.4	-11
Class III-----	4.6	--	--	7.0	6.1	7.5	4.0	3.2	4.3	+34
All classes-----	4.5	6.5	6.7	6.4	6.1	7.6	5.6	7.1	5.8	-18
Mallard and blue-winged teal:										
Nesting effort:										
Per sq. mi. of lake and marsh-----	4.0	2.7	2.5	--	6.5	3.0	2.5	1.3	1.6	+22
Per mile of stream-----	.19	.12	.03	--	.07	.04	.05	.02	.04	+100